डा० विद्या निवास मिश्र
प्राध्यापक, भाषा विभाग
निजी पुस्तकालय
पुस्तक संख्या……………

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PHONETICS IN ANCIENT INDIA

BY

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PREFACE

THIS book is intended as a guide to the appreciation of the earliest phoneticians. Whitney's pioneer expositions of certain of our sources some eighty years ago are acknowledged in the introductory chapter; but a general reinterpretation has now long been overdue, and this fact is in itself suggestive of the remarkable quality of the Indian texts. For it implies that they display a level of phonetic discourse beyond the full comprehension of Whitney and his contemporaries, such as only the advances of the late nineteenth and the twentieth centuries enable us to appreciate today. The recognition that analyses so advanced in their technique should have been evolved at so early a date may well inspire a salutary scientific humility, and it would be at once arrogant and pessimistic not to expect that a reinterpretation will again be necessary in another eighty years—or even eight.

I am grateful to Professor J. R. Firth for the encouraging interest he has shown at all stages in the progress of this work, and no less for his constructive suggestions; and I am happy to acknowledge the researches of Dr. Siddheshwar Varma, the stimulus of whose published work has been augmented for me by the background of his personal association with Professor Firth over twenty years ago—an association which has led, in the light of contemporary linguistics, to a fuller realization of the wealth that lies in the ancient treatises. My thanks are also due to Professor J. Brough, who read the work in manuscript and made a number of helpful criticisms, and to Mr. C. A. Rylands and Mr. R. H. Robins, who generously undertook to read the whole of the proofs during my absence in India.

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N.B. Where more than one edition is noted, an asterisk signifies that the edition in question has been adopted for purposes of text and numbering (exceptions are duly indicated).

Āpiśali-Śikṣā (*Āp. Ś.*)
Ed. Raghu Vira, *JVS* i. 2, 1934, pp. 225 ff.

Atharva-Prātiśākhya (*AP*) (= *Śaunakīyā Caturādhyāyikā*)
Ed. and trsl. W. D. Whitney, *JAOS* vii. 333 ff.

Atharva-Prātiśākhya (See p. 5, n. 1)
*Ed. and trsl. S. K. Shastri. Lahore, 1939
Ed. V. B. V. Shastri. Lahore, 1923

Bhāradvāja-Śikṣā
Ed. and trsl. E. Sieg. Berlin, 1892
*Ed. V. R. R. Dikshitar and P. S. S. Ayyar. Poona, 1938

Kauhali-Śikṣā
Ed. Sadhu Ram, *JVS* ii. 1, 1935, pp. 108 ff.

Mahābhāṣya (*Mbh.*)
*Ed. F. Kielhorn. Bombay, 1892–1909
✓ With *Pradīpa* of Kaiyaṭa and *Pradīpoddyotana* of Annambhaṭṭa, ed. P. P. S. Sastri (Part I, *Āhnikas* 1–4). Madras, 1948
Trsl. V. Trapp (*Āhnikas* 1–5). Leipzig, 1933

Pāṇini (*Pāṇ.*)
*Ed. and trsl. O. Böhtlingk. Leipzig, 1887
✓ Ed. and trsl. S. Chandra Vasu. Allahabad, 1891–7
Ed. O. Böhtlingk. Bonn, 1839–40
✓ Trsl. L. Renou (Fasc. I, *Adhyāya*, i–iii). Paris, 1948

Pāṇinīya-Śikṣā (*PŚ*)
✓ Ed. and trsl. A. Weber, *Indische Studien*, iv, 1858, pp. 345–71
*With the *Pāṇinīyaśikṣāpradīpa* and *Svaravaidikaprakaraṇapaṅktivivaraṇa*, ed. R. P. Sharma. Benares, 1937
With the *Śikṣā-Pañjikā* and *Śikṣā-Prakāśa*, ed. and trsl. M. Ghosh. Calcutta, 1938

Piṅgala, Chandaḥ Sūtra
Ed. and trsl. A. Weber, *Indische Studien*, viii, 1863, pp. 209 ff.
*With the commentary of *Halāyudha*, ed. V. N. Shastri (*Bibl. Indica*). Calcutta, 1874

Pratijñā Sūtra
A. Weber, *Über ein zum weissen Yajus gehöriges phonetisches Compendium, das Pratijñā Sūtra* (*Abh. d. kön. Ak. d. Wiss. z. Berlin*, 1871)

Ṛk-Prātiśākhya (*RP*)
- With the commentary of Uvaṭa.
  - *Ed. and trsl. M. D. Shastri. Allahabad, 1931, Lahore, 1937
- With extracts from Uvaṭa.
  - Ed. and trsl. F. Max Müller = *Rig-Veda*, vol. i, pp. i–cccxcv. Leipzig, 1856
  - Ed. and trsl. Regnier, *Journal Asiatique*, V série, vols. vii–xii

Ṛktantravyākaraṇa (*RT*)
- *Ed. S. K. Shastri. Lahore, 1933
- Ed. A. C. Burnell. Mangalore, 1879

Śaiśirīya-Śikṣā
- Ed. T. Chowdhury, *JVS* ii. 2, 1935, pp. 197 ff.

Sarvasaṃmata-Śikṣā
- Ed. and trsl. A. O. Franke. Göttingen, 1886

Śikṣā-Saṃgraha (*ŚS*)
- *A Collection of Śikṣās by Yājñavalkya and others*, ed. Yugalakiśora Vyāsa (*Benares Skt. Series*), Benares, 1893

Taittirīya-Prātiśākhya (*TP*)
- With the *Tribhāṣyaratna*.
  - *Ed. and trsl. W. D. Whitney, *JAOS* ix, 1871
  - Ed. Rājendralāla Mitra (*Bibliotheca Indica*), Calcutta, 1872
- With the *Padakramasadana* of Māhiṣeya.
  - Ed. V. V. Sharma. Madras, 1930
- With the commentaries of Somayārya and Gārgya Gopālayajvan.
  - Ed. K. Rangacharya and R. S. Sastri (*Bibl. Sansk.* 33). Mysore, 1906

Upalekha
- Ed. and trsl. W. Pertsch. Berlin, 1854

Vājasaneyi-Prātiśākhya or *Kātyāyanīya-Prāt.* (*VP*)
- With the commentaries of Uvaṭa and Anantabhaṭṭa.
  - *Ed. V. V. Sharma. Madras, 1934
- With extracts from the commentaries.
  - Ed. and trsl. A. Weber, *Indische Studien*, iv, 1858, pp. 65–171, 177–331

Varṇapaṭalam
- *The Pariśiṣṭas of the Atharvaveda*, xlvii, ed. Bolling and Negelein. Leipzig, 1909–10

Vyāsa-Śikṣā (*VŚ*)
- *H. Lüders, *Die Vyāsa-Śikṣā*. Göttingen, 1894
- Ed. V. V. Sharma. Madras, 1929
- Ed. K. V. Śāstri (Grantha text). Tiruvadi, 1908

INTRODUCTION

0.0. *The Grammatical Achievement*

In the sphere of grammar it is a gratifying custom of present-day linguists to pay lip-service to the greatest of descriptive grammarians, the ancient Indian Pāṇini: and it was an eloquent tribute to his achievement that one of the great linguists of our own time should write:

> Indo-European comparative grammar had (and has) at its service only one complete description of a language, the grammar of Pāṇini. For all other Indo-European languages it had only the traditional grammars of Greek and Latin, wofully incomplete and unsystematic. . . . For no language of the past have we a record comparable to Pāṇini's record of his mother tongue, nor is it likely that any language spoken today will be so perfectly recorded.[1]

But in spite of the invaluable translations of his work by Böhtlingk and now by Renou, unless the linguist is himself also a Sanskritist there are insuperable difficulties in the way of a full appreciation of Pāṇini's achievement; and even for the Sanskritist a complete understanding is not easily attained—again to quote Bloomfield,

> Even with the many commentaries that we possess . . . several lifetimes of work will have to be spent upon Pāṇini before we have a conveniently usable exposition of the language which he recorded for all time.

It is indeed in the extent of the interpretative material, some of which has itself attained to a canonical status, that we find striking evidence of the honour accorded to the great grammarian in his own land.[2] But this profusion of commentaries also bears witness to the difficulties of Pāṇini's technique: composed with an algebraic condensation, his work is a linguist's and not a language-teacher's grammar, and for the more pedestrian purpose of teaching Sanskrit rewriting was a practical necessity, thus giving rise to further grammatical hierarchies descending to a miscellany of school-grammars of recent date.[3] It has been calculated that there are in existence over a thousand different Sanskrit works on Sanskrit grammar,[1] all inspired, directly or indirectly, by Pāṇini's model: beside such a concourse the thousand manuscripts of Priscian's Latin Grammar,[2] the pride of our western tradition, are but a drop in the grammatical ocean. We have also to remember that Pāṇini himself acknowledges a number of predecessors, whose work, except for fragmentary citations, has been lost to us—Burnell has listed by name no less than sixty-eight of these pre-Pāṇinean grammarians;[3] well might the medieval philosopher Kumārila remark,

---

[1] L. Bloomfield, *Language*, v. 270 ff.

[2] In the *Pradīpoddyota* of Nāgojī Bhaṭṭa, written some two thousand years after Pāṇini's *Aṣṭādhyāyī*, we have a sub-commentary of no less than the fourth degree.

[3] e.g. Rāmacandra's *Prakriyākaumudī*>Bhaṭṭojī Dīkṣita's *Siddhāntakaumudī*>Varadarāja's *Laghukaumudī*.

> We cannot think of any point of time totally devoid of some work or other dealing with the grammatical rules treating of the different kinds of roots and affixes.[4]

But commendable as the cause may be, the non-Sanskritist can hardly be expected to acquire the grammar of Sanskrit—for which the Indian tradition prescribes twelve years' study—to the sole end that he may more fully appreciate the work of the 'linguistic Homer',[5] or of later 'grammatical saints'.[6]

In phonetics, we all too rarely look back beyond the great names of the nineteenth century—Henry Sweet, A. J. Ellis, Alexander Melville Bell—except occasionally to honour a few lonely and half-forgotten figures of the immediately preceding centuries.[7] We justify some of our more grotesque and inadequate terminology (e.g. '*tenuis*' and '*media*')[8] by tracing it back to the Latin grammarians, sometimes as far as Dionysius Thrax or even Aristotle: but generally speaking the expressions of ancient phonetic thought in the west have little to repay our attention or deserve our respect, whereas Indian sources as ancient and even more ancient are infinitely more rewarding. And in this field the linguist is fortunately in a more advantageous position to appreciate the ancient achievement, in that the acquisition of a working knowledge of the Sanskrit sound-system demands no very considerable labour, and in so far as there is a basis for general phonetic discussion which there is not for 'general grammar'.[9]

---

[1] Belvalkar, *Systems of Sanskrit Grammar*, p. 1.

[2] Cf. Sandys, *History of Classical Scholarship*, i. 259.

[3] *The Aindra School of Sanskrit Grammarians*, pp. 32 f.

[4] *Tantravārttika*, trsl. Ganganatha Jha, p. 306.

[5] P. Thieme, *Pāṇini and the Veda*, p. 95.

[6] Goldstücker, *Pāṇini*, p. 52 (of Kātyāyana and Patañjali).

[7] Cf. D. Abercrombie, 'Forgotten Phoneticians', *TPS* 1948, pp. 1 ff.

[8] See further 1.120 below.

[9] Cf. Vendryès, *BSL* xlii. 8 f.

0.1. *The Indian Influence on Western Phonetics*

Moreover the link between the ancient Indian and the modern Western schools of linguistics is considerably closer in phonetics than in grammar. For whilst Pāṇinean techniques are only just beginning to banish the incubus of Latin grammar, our phonetic categories and terminology owe more than is perhaps generally realized to the influence of the Sanskrit phoneticians. The impact of Sir William Jones's 'discovery' of Sanskrit on the course of Western linguistics is well known; but Jones, apart from his knowledge of the Sanskrit language, was also acquainted with the traditional statements of its sound-system: in his 'Dissertation on the Orthography of Asiatic words in Roman Letters' the whole order of treatment and descriptive technique is clearly based on Indian models. In a paper on 'The English School of Phonetics'[1] Professor J. R. Firth has said of this great orientalist,

> Without the Indian grammarians and phoneticians whom he introduced and recommended to us, it is difficult to imagine our nineteenth century school of phonetics.[2]

The influence of the Indian works on the phonetic views of William Dwight Whitney may be clearly seen in the discussions published in the *Journal* of the American Oriental Society during the years 1862–6, subsequent upon the appearance of Lepsius's *Standard Alphabet*;[3] and we have the feeling that without their teaching Whitney might not have been in a position to express self-righteous indignation against that other country from which he had learnt so much—

> It is really amazing how some of the most able physiologists and philologists of that nation (i.e. Germany) have blundered over the simple and seemingly obvious distinction between an *s* and a *z*, an *f* and a *v*, a *p* and a *b*, etc.[4]

The 'seemingly obvious' distinction of voiced and voiceless here referred to was subsequently recognized by Lepsius as 'derived from the Sanskrit grammarians'.[1]

---

[1] *TPS* 1946, pp. 92 ff.

[2] It is remarkable that a German study of the English School should fail to make any reference whatever to the Indian influence (H. Raudnitzky, *Die Bell-Sweetsche Schule: Ein Beitrag zur Geschichte der englischen Phonetik*, Marburg 1911).

[3] '*A Standard Alphabet for reducing Unwritten Languages and Foreign Graphic Systems to a Uniform Orthography in European Letters*' (London, 1885).

[4] *JAOS* vii. 313. Cf. *Trans. Am. Phil. Assoc.*, 1877, pp. 41 ff.

In England the Indian influence is evident in the work of A. J. Ellis, especially in Part IV of his *Early English Pronunciation*, where frequent references are made to Whitney's translations of the ancient works and also to his own observations on the speech of latter-day pandits. He displays on occasion a fuller appreciation of the ancient statements than Whitney had done, and generously remarks on their descriptions of 'voiced *h*',[2]

> The wonder is, not that they should be indistinct, but that they should have been so much *more* distinct than the host of European grammarians and orthoepists who succeeded them.

As yet, however, the linguist cannot survey the Indian phonetic achievement without undertaking an extensive course of reading, of which only a certain proportion will be relevant to his purpose; and on the other hand, without having viewed the overall framework of the Indian analysis he can hardly assess individual descriptions. The principal works have been translated and commented upon (so far as the phonetic climate of the translator's environment permitted) by such Western scholars as Whitney, Weber, Regnier, and Max Müller, and more recently by Indian scholars amongst whom may be especially mentioned M. D. Shastri, S. K. Shastri, and M. Ghosh. An interesting selection of special problems has been discussed in detail by Siddheshwar Varma in his *Critical Studies in the Phonetic Observations of Indian Grammarians*. The present study aims at presenting a systematic account of Indian phonetic doctrine so far as it appears to possess more than purely Sanskritic interest. Where Western antiquity provides any particularly striking parallels or contrasts, some account of these has been given with a view to the comparative evaluation of the Indian statements. Occasional discussions related to later Indo-Aryan developments have been inevitable in establishing a control for the pronunciations described in the treatises.

0.2. *The Sources*

Of the works themselves it will be sufficient to note that they fall into two main categories, the *Prātiśākhyas* and the *Śikṣās*.

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[1] *JAOS* viii. 344.

[2] See further 1.120. below.

The former are phonetic treatises relating to the pronunciation of the four Vedas, namely:

Ṛg-Veda — *Ṛk-Prātiśākhya*
Sāma-Veda — *Ṛk-tantra-vyākaraṇa*
Black *Yajur-Veda* — *Taittirīya-Prātiśākhya*
White „ — *Vājasaneyi-* or *Kātyāyanīya-Prātiśākhya*
Atharva-Veda — *Atharva-Prātiśākhya.*[1]

The Śikṣās on the other hand are, with some exceptions, less specifically related to a particular Veda, but in many cases supplement the teaching of the Prātiśākhyas.[2] Whilst it is likely that the Prātiśākhyas are based on an early Śikṣā (such as that referred to in the Taittirīya Āraṇyaka),[3] our extant texts of the latter appear to be of later date than the former: the most important of them, the so-called *Pāṇinīya-Śikṣā*, is sometimes claimed as the original Śikṣā and in consequence put back to a very early date: but this, as also its attribution to Pāṇini, is highly doubtful.[4] Varma places the Prātiśākhyas in the period 500–150 B.C. and the extinct Śikṣā literature between 800 and 500 B.C.[5] It is significant that one at least of the extant Śikṣās contains the admission,

> If Śikṣā and Prātiśākhya are found at variance, the Śikṣā is said to be the less authoritative, as the deer is weaker than the lion.[6]

Apart from these specifically phonetic works, numerous statements on phonetic matters are to be found in the grammatical works, more especially in Pāṇini's *Aṣṭādhyāyī* and Patañjali's

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[1] As Whitney himself has admitted, the text which he has edited and translated under this title is probably not *the AP*, and so should strictly be known by the title which it bears, viz. *Śaunakīyā Caturādhyāyikā*. Nevertheless, *the AP*, if such it be (ed. S. K. Shastri, V. B. V. Shastri), contains almost nothing of general interest, and for present purposes the title *AP* may be retained without disadvantage to refer to Whitney's edition.

[2] Cf. Kielhorn, *Ind. Antiq.* v. 141–4, 193–200 (esp. p. 199).

[3] VII. ii. 1, *oṃ śikṣāṃ vyākhyāsyāmaḥ*. The subjects of the Śikṣā are given as *varṇaḥ* ('sound-unit'), *svaraḥ* ('tone'), *mātrā* ('quantity') *balam: sāma saṃtānaḥ*. Sāyaṇa interprets *balam* as 'degree of buccal closure' (cf. I.11. below), *sāma* as 'tempo' and *saṃtānaḥ* as 'junction'.
Cf. Sten Konow, *Acta Orientalia*, XIX. iv, 1943, p. 295.

[4] Cf. Thieme, op. cit., p. 86 n.

[5] Op. cit., Introd.

[6] *Sarvasammata-Śikṣā*, ed. Franke, 49.
śikṣā ca prātiśākhyaṃ ca virudhyete parasparam
śikṣaiva durbalety āhuḥ siṃhasyaiva mṛgī yathā.

Mahābhāṣya; and it is evident that in India, unlike Europe, grammatical writers availed themselves of the best professional phonetic advice.[1] In such ancient and non-technical works as the Brāhmaṇas, Āraṇyakas, and Upaniṣads we find a familiarity with various phonetic categories, e.g. 'articulator', 'place of articulation', 'stop', 'fricative', 'semivowel', 'vowel', and 'voice' (in its technical connotation);[2] and in the White Yajur-Veda there appear in an anatomical list various features which belong to the structure of articulatory and not of general physiological analysis,[3] e.g. 'teeth-rims', 'alveoli',[4] and parts of the tongue, of which the tip is appropriately associated with Sarasvatī, the goddess of speech.[5]

The aphorisms of the phonetic works are at once prescriptive and descriptive. Their avowed purpose is to preserve the oral tradition of the sacred texts: to this end the direst penalties are threatened for mispronunciation, including descent to the hell of Kumbhīpāka;[6] the competent pupil, on the other hand, is encouraged by verses such as that which closes the *TP*—

> He who knows the distinctions of tone and length may go and sit with the professors.[7]

—a felicity which the commentator interprets as applying not only in this world but also in the next. However, the authors of our treatises were clearly phoneticians rather than priests, and a scientific curiosity, coupled with keen audition and an effective methodology, led to descriptions which must surely have transcended their original terms of reference.

Nor are the accounts of the various authors identical; we find considerable divergences of pronunciation as between one treatise and the next, and we may surmise that these disagreements in many cases reflect actual dialectal features corresponding to the location of the several *Śākhās* or Vedic schools. In such matters there is a singular lack of religious dogmatism, and the authors refer to each other's opinions in a commendably objective manner. Certain pronunciations, however, are generally recognized as faulty, and lists of such faults (e.g. in chap. xiv of the *RP*) are hardly less interesting than the details of the approved pronunciation.

---

[1] Patañjali (*Mbh.* 1. ii. 1, on *Pāṇ* 1. ii. 32, Kielhorn, i. 208) makes the important point that the study of grammar presupposes adequate phonetic education.

[2] e.g. *Gopatha Br.* i. 24 (*sthānānupradāna-karaṇam*); *Ait. Ār.* III. ii. 1, *Chānd. Up.* II. xxii. 3–5 (*sparśa, ūṣman, antasthā, svara, ghoṣavat*). Cf. Liebich, *Einführung in die ind. einheimische Sprachwissenschaft*, ii. 9; Weber, *Ind. St.* iv. 75 n.

[3] Cf. Hjelmslev, *Omkring Sprogteoriens Grundlæggelse*, p. 51.

[4] On these terms see further 2.03 below.

[5] *VS* xxv. 1.

[6] *Pārāśarī Ś.* (*ŚS.*, p. 65).

[7] xxiv. 6. *svara-mātrā-vibhāga-jño gacched ācārya-saṃsadam.*

The Prātiśākhyas have received the attentions of various later commentators. In so far as these are the bearers of a continuous tradition, they are able to augment and elucidate the laconic brevity of the aphorisms: unfortunately, however, the main stream of the tradition seems in many cases to have been lost, and the commentaries that we possess have a habit of wrapping the obvious in obscurity instead of casting light on the numerous difficulties. Moreover, it is clear that the intellectual climate of phonetic study had undergone a marked deterioration between the time when the treatises were composed and the time of our commentaries. In general we may say that Henry Sweet takes over where the Indian treatises leave off—though in some matters even Sweet could have learnt from them: and a recent study of a modern Indo-Aryan language has successfully shown that many of the ancient descriptive techniques can still be employed to advantage.[1] These early phoneticians speak in fact to the twentieth century rather than to the Middle Ages or even the mid-nineteenth century, and many a statement which the commentators and even Whitney or Max Müller have failed to comprehend makes immediate sense to the phonetician today. The one outstanding exception to the general mediocrity of the Indian commentators is Uvaṭa, whose interpretations of the *RP* and of the *VP* reveal an enlightened and enlightening approach to a variety of phonetic topics.

0.3. *The Sanskrit Alphabet*

Whilst the statements with which we shall be concerned are of wide phonetic interest, even the most general of them are of course based on the description of a particular language, namely Sanskrit. On p. 20 a chart is therefore provided showing the basic system of sound-units as generally assumed by our treatises: certain divergences from this system will be considered in their appropriate place. As regards the transcription, two conventions have been employed: for purposes of textual quotation, the standard Roman transliteration of the Devanāgarī text is used (in italic type)—this will not generally concern the non-Sanskritist, as the texts will be translated and the original Sanskrit, unless it calls for special comment, relegated to footnotes. Where, however, Sanskrit sounds and sound-sequences are made a subject of phonetic discussion, a transcription is used which departs in some respects from the standard system, and which I have found convenient in the teaching of Sanskrit phonetics: such transcriptions are printed in heavy I.P.A. type. In the chart on p. 20 the two conventions are shown side by side. Where narrower transcriptions are required, these are indicated by the use of square brackets.

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[1] B. N. Prasad, *A Phonetic and Phonological Study of Bhojpurī* (Thesis submitted for the Ph.D. Degree of the University of London, 1950).

It should be stressed at this point that, except for transcriptional purposes, the representation of a complex structure by category-labels based on a monosystemic analysis is an unacceptable procedure, which has nevertheless been adopted by the many modern linguists who favour an exclusively 'phonemic' approach: the reason for setting up such a system in our chart is that the Indians themselves have done so. It is true that the Devanāgarī method of writing is syllabic, but the analysis underlying it and actually set out, for example, in the *varṇa-samāmnāya* or 'alphabet' at the beginning of Pāṇini's grammar, comes very near to that which a modern 'phonemicist' would evolve for Sanskrit by a substitutional-distributional analysis of the word-isolates.[1] However, we can hardly criticize our predecessors of some two millennia ago for a procedure which only a few linguists in the last two decades have begun to reject as inadequate;[2] and we shall see that the Indians, unlike many of their Western successors, appreciated that this technique was a means to a limited practical end, and by no means the ultimate analysis.

0.4. *The Principles of Description*

We come now to a consideration of the fundamental principles of analysis and description as postulated and as observed by the authors of our treatises.

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[1] Cf. M. B. Emeneau, 'The Nasal Phonemes of Sanskrit', *Language*, xxii. 86 ff.; A. H. Fry, 'A Phonemic Interpretation of Visarga', *Language*, xvii. 194 ff.

[2] Cf. J. R. Firth, 'Phonological features of some Indian languages', *Proc. 2nd Int. Cong. Phon. Sc.*, pp. 176 ff.; W. F. Twaddell, 'On defining the Phoneme', (*Language Monograph*, xvi), especially pp. 54 f.

0.40. *Word and Sentence*

In early Indian linguistic discussion we find a full awareness of the view that the basic linguistic unit, upon which all other analyses must be founded, is the sentence; a famous couplet of Bhartṛhari's treatise on general linguistics, the *Vākyapadīya*, where the matter is debated at some length, states the case in the following terms:

> Within the sound-unit the component features have no independent existence, nor the sound-units within the word; nor have the words any separate existence apart from the sentence.[1]

For purposes of phonetic description the basic unit is also sometimes stated as the 'breath-group' (*eka-prāṇa-bhāva*),[2] corresponding in the Vedic hymns to one line of verse. The tendency to deny independence to the word is further stressed by the Sanskrit system of writing, which (unlike, e.g. Old Persian) takes no particular account of word-division.[3] Thus word-sequences such as **taan eva, tat punah** are written together as **taaneva, tatpunah,** the sequences **-ne-** and **-tpu-** being represented as single graphic units (ने, त्पु). This elimination of the inter-word spaces as indications of junction is partially compensated by the graphic representation of such phonetic junction-features as the available symbols are capable of showing: thus the junction of **tat+bhavati** is written as **tadbhavati, tat+ʃrutvaa** as **tacchrutvaa, tat+hi** as **taddhi, maa+udakaih** as **modakaih,** and so forth. Certain other junction-features are not generally indicated, sequences of the type **-h+k-** or **-h+p-** being only sporadically written as **-xk-** or **-ɸp,**[4] since **x** and **ɸ** are outside the phonemic and hence the general graphic system. Even rarer is the indication of the linking ^{y} prescribed by the phoneticians in sequences such as **taa^{y}abruvan** (for **taah+abruvan**), which is generally written with hiatus as **taa abruvan.**[5] Elsewhere junction-features may be neither written nor prescribed, so that no distinction is recognized between, for example, **na tena likhito lekhah,** 'he did not write the letter', and **natena likhito lekhah**, 'bowing, he wrote the letter'; this fact provides material for the construction of various types of word-play and riddle based on alternative divisions of the piece,[1] and our treatises do not mention any phonetic criteria by which a distinction might have been indicated in utterance.[2] Whether in fact there were subtle distinctions of prominence such as are capable in English of differentiating, for example, *a notion* from *an ocean*[3] we cannot tell—it would certainly be unwise to deny the possibility on the basis of an *argumentum ex silentio*—but it appears certain that in Sanskrit a delimitation of the word by purely phonetic criteria was even less of a possibility than in English.

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[1] i. 73. Cf. Rosetti, *Le Mot*, p. 20.

[2] *TP* v. 1. Cf. Sweet, *Primer of Phonetics*, § 93; Rousselot, *Principes de phonétique expérimentale*, p. 972 ('Le mot . . . n'existe sans altération qu'à l'état isolé. . . . Le groupe respiratoire possède une individualité propre); Thumb, *Handbuch des Sanskrit*, § 160.

[3] Cf. Whitney, *Skt. Gr.*, § 9 B; Bloch, *L'Indo-Aryen*, pp. 75 f.

[4] Cf. Wackernagel, *Ai. Gr.*, § 226.

[5] Cf. Wackernagel, op. cit., § 285 b (*β*).

The Vedic texts in fact come down to us in two principal forms: the *Saṃhitā* or 'compound' text, with the sentence or breath-group as its basic unit, and the *Pada* or 'word' text, having the word-isolate as its basis; the latter is generally recognized to be an artificial analysis devised by grammarians and others for purposes of instruction: that of the *R̥gveda* is generally attributed to the ancient grammarian Śākalya.[4] In the *AP* we find,

> The study of the word-isolates is designed to teach the beginnings and ends of words, and their correct form, tone and meaning.[5]

to which the commentator adds,

> Without studying the word-isolates one might make errors in the continuous text; it is for this reason that the study of the isolates is necessary.[6]

Some statements of the relationship of *Pada* to *Saṃhitā*, however, seem to have left room for misinterpretation: the *RP* makes the highly ambiguous observation, '*saṃhitā padaprakr̥tiḥ*',[7] which according to the interpretation of '*pada-prakr̥tiḥ*' (where *prakr̥tiḥ* ='basis') might mean either 'The *Saṃhitā* is the basis of the *Pada*' or 'The *Saṃhitā* has the *Pada* as its basis'; the term *prakr̥ti* is also regularly used of the word-isolate in contradistinction to *vikāra* ('modification', 'variant'), the latter being applied to the junction-forms. A convincing solution to the difficulty is provided by the *Vaidikābharaṇa*, a commentary on the *TP*, which points out that as a result of statements such as the above 'certain slow-witted persons have made the mistake of thinking that the Veda is constituted of the word-isolates', whereas in fact 'the word-isolates are only treated as a basis for the purpose of facilitating instruction.'[1]

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[1] Cf. *Mbh.* I. i. I (Kielhorn, i. 14).

[2] Though so long as the tonal system survived, this must in many cases have provided a means of distinction.

[3] Cf. D. Jones, 'The word as a phonetic entity', *MF* 1931, pp. 60 ff; Bloomfield, *Language*, pp. 113 f., 182.

[4] Cf. Liebich, op. cit., pp. 20 ff.

[5] iv. 107. *padādhyayanam antādi-śabda-svarārtha-jñānārtham.*

[6] . . . *apadādhyāyī saṃhitāṃ vināśayet; tasmād ebhiḥ kāraṇair avaśyādhyeyāni.*

[7] ii. I.

Here also should be mentioned the *Krama-pāṭha* or 'repetitive' text, in the simplest form of which a word-sequence 1:2:3:4:5 is recited in pairs as follows—1 2:2 3:3 4:4 5, with the realization of the appropriate junction-features between the members of each pair.[2] This device forms an instructional stepping-stone between the *Pada* and *Saṃhitā* texts; it appears to be held in no very high esteem, and the most that the *RP* can say for it is,

> The *Krama* is of no use to one who knows both the *Pada* and the *Saṃhitā*. . . . It does neither good nor ill, and has no sacred tradition.[3]

The recognized function of the Prātiśākhyas appears to have been instruction firstly in the pronunciation of the word-isolates and secondly in the mode of their synthesis in the sentence. The first of these duties, however, involves the teacher in further analysis, below the word-isolate level: and since all analysis must be followed by synthesis,[4] the *TP* aptly observes that there are various types of synthesis[5]—of words, of syllables, and of sound-units, to which is added as a fourth category, if we follow the commentator's interpretation,[6] the reintegration of syllable-structure.[7] Whitney, failing to understand this passage, can only remark that 'these four rules have no significance whatever, being a mere bit of outside classification, in which someone has amused himself by indulging'. In one passage of the *RP* Uvaṭa notes that strictly speaking the author is exceeding his duties by giving rules for tonal synthesis within compounds; the basis of synthesis, he claims, should be whole words as institutionalized[1] units: he is prepared to be indulgent, however, for

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[1] On iii. 1. *vibhakta-rūpasya tu prakṛtitvaṃ vyutpādana-saukaryārtham āśrīyate.*

[2] Cf. *RP* xi. 44.

[3] xi. 66.

kramena nārthaḥ pada-saṃhitā-vidaḥ

. . . . .

na codayāpāya-kāro na ca śrutaḥ.

[4] Cf. Sweet, op. cit., § 91.

[5] xxiv. 1–4. *atha catasraḥ saṃhitāḥ: pada-saṃhitākṣara-saṃhitā varṇa-saṃhitāṅga-saṃhitā ceti: nānā-pada-saṃdhāna-saṃyogaḥ pada-saṃhitety abhidhīyate: yathā-svam akṣara-saṃhitādīnām apy evam.*

[6] This interpretation of *aṅga-saṃhitā* is based on xxi. 1 (*vyañjanaṃ svarāṅgam*); cf. also 3.20 below.

[7] For the fourth category cf. especially Sweet, loc. cit., 'Synthesis, lastly, deals with the organic and acoustic *grouping* of sounds into syllables, etc., and the divisions between these groups.'

> ... just as a flower-picker may also pick fruit, and a wood-gatherer may also gather honey, such is the case.[2]

0.41. *Phonetics and Phonology*

There is, on the other hand, one respect in which our treatises do not fulfil the functions which they claim. The first verse of the *AP* declares,

> Our subjects are the (phonetic) attributes in junction and in isolation of the four word-classes, viz. noun, verb, preposition and particle.[3]

This grammatical enumeration suggests that we may expect something like a phonological treatment, with grammar and phonetics integrated into a functional whole; and Uvaṭa, commenting on the *VP*, goes so far as to claim,

> This treatise excels all other treatises in that it combines the two disciplines of phonetics and grammar.[4]

This, however, is in the nature of a pious aspiration which regrettably does not see fulfilment: for our text makes scant reference to any grammatical function.[5] Particularly remarkable is the failure of the phoneticians to discuss one of the outstanding phonological processes of Sanskrit, that of 'vowel-gradation': for certain phonological purposes it is convenient to recognize a system of vocalic alternation of the type:

Grade 1.	**i**	**u**	**ṛ**
,, 2.	**e**	**o**	**ar**
,, 3.	**ai**	**au**	**aar**

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[1] *siddha*, lit. 'established'.

[2] On iii. 26. *nanu padānāṃ lakṣaṇaṃ na kartavyam: siddheṣu hi padeṣu saṃhitā-prakṛtiḥ: satyam eva: yathā puṣpāhārasya phalāharaṇaṃ dārv-āhārasya madhv-āharaṇam: evam etat.*

[3] *caturṇāṃ pada-jātānāṃ nāmākhyātopasarga-nipātānāṃ sandhya-padyau guṇau prātijñam.*

[4] On i. 169.

[5] Cf. Lüders, *Vyāsa-Śikṣā*, p. 102; Goldstücker, *Pāṇini*, pp. 195 ff.

The working of this alternation is seen in verbal forms such as:

(√**stu-**, 'praise')		(√**kṛ-**, 'make')	
P.P.	**stutá**	P.P.	**kṛtá-**
Inf.	**stótum**	Inf.	**kártum**
Pr. Ind.	**staúti**	Pf. Ind.	**cakaára**

Though ignored by the phoneticians, this alternation is duly noted by Pāṇini (in his opening aphorisms) and his followers, who treat Grade 1 (corresponding to the Indo-European 'reduced' grade) as basic, giving to Grade 2 (= IE 'normal' grade, or 'Vollstufe') the title of *guṇa* or 'secondary quality', and to Grade 3 the title of *vṛddhi* or 'increase'.[1] A further phonological process which is similarly disregarded is that of *saṃprasāraṇa* (lit. 'extension'),[2] whereby a sequence of the type **va**, i.e. **v**+syllabicity, alternates with **u**, i.e. 'syllabic v' (cf. Pr. Ind. **svapiti** : P.P. **supta-**, &c.). Pāṇini uses the term both for the process and for the resultant vowel;[3] but we find neither the term nor any discussion of the process in the phonetic works. Nor again do we find there any use of that great creation of Pāṇini's genius, the phonological zero.[4]

This mention of phonological omissions, however, is not to be taken as in any way detracting from the value of the treatises from a purely phonetic point of view.

0.42. *Terminology*

Before proceeding to the textual material some account must be given of certain terminological features which run through the whole system of description.

A particular problem is presented by the word *varṇa*, which can be most conveniently discussed by reference to the terminology of the Latin doctrine of letters.[1]

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[1] *Pāṇ.* I. i. 1 ff. *vṛddhir ād-aic: ad-eṅ guṇaḥ: iko guṇa-vṛddhī.* The term and process of *guṇa* are in fact first referred to by the early etymologist Yāska (*Nir.* x. 17, deriving *śeva* from *śiṣyate*). Only passing references are found in the phonetic works (*guṇa* in *RP* xi. 10, *vṛddhi* in *VP* v. 29, *AP* (ed. S. K. Shastri) iii. 1.13, 4.3). Cf. Edgerton, *Skt. Hist. Phonology* (*JAOS* Supp. 5, 1946), §§ 118 ff.

[2] The relevance of the term is not clear. The form *prasāraṇa* is also found, and is used by the *AP* (ed. Shastri) iii. 1.13 c to refer to the replacement of **-bh-** by **-p-** in **dipsati**<**dabh-**. See further Edgerton, '*Saṃprasāraṇa* "Emergence; emergent (vowel)" ', *JAOS* lxi. 222 f.

[3] I. i. 45. *ig yaṇaḥ saṃprasāraṇam.* Cf. VI. i. 108 (also VI. i. 13, VI. iv. 131).

[4] *Pāṇ.* I. i. 56 ff. Cf. Buiskool, *The Tripādī*, pp. 31 ff. The modern usage begins with Sweet, *New English Grammar*, pt. i, § 77 ('negative inflection'); cf. De Saussure, *Cours*, pp. 124, 254 ff.; Nida, *Morphology*, p. 46; Jakobson, 'Signe Zéro', *Mél. Bally*, pp. 143 ff.; Frei, 'Zéro, vide et intermittent', *Z. f. Phonetik* 1950, 3/4, pp. 161 ff.

The usual method of designating a particular Sanskrit consonant-unit is to realize its '*potestas*' by combining it in a syllable with the vowel -*a*[2] (e.g. **k**(*a*), corresponding to a '*figura*' क्); the '*nomen*' is then provided either by this syllable alone (i.e. *ka*) or, more usually with the suffix -*kāra*,[3] lit. 'making' (i.e. *ka-kāra*). In the case of the vowels the necessity of adding -*a* does not of course arise (thus e.g. *figura* इ, *potestas* **i**, *nomen i* or *i-kāra*). Alternatively the *nomen* may be manufactured by realizing the *potestas* in combination with the enclitic particle *iti*[4] (e.g. **k**(*iti*), giving a *nomen kiti*), which has an effect comparable with that of our graphic device of inverted commas (i.e. *kiti* = "**k**").

The outstanding exception to this mode of designation is **r**, which is given the *nomen* 'repha',[5] variously interpreted as meaning 'growl, snarl' (cf. the Latin '*littera canina*') or 'tearing' (as of cloth).[6]

To refer to a sound-unit in general, however, we encounter the word *varṇa*, the use of which is concisely summed up by the *VP*—

> What are listed (sc. in the *varṇa-samāmnāya*) are *varṇas*.[7]

But the term *varṇa* is never used to form a *nomen* in the manner of -*kāra*. Its suffixal use is in fact strictly limited: it is found appended only to the short vowels, with the function of designating not only, for example, the short vowel **i** itself, but also the long **ii** (*ī*) and the rare protracted **iii** (*ī3*):[8] to denote simply the short vowel, *i-kāra* and not *i-varṇa* is used. It thus becomes evident that *varṇa* primarily denoted not a sound-unit but a more comprehensive sound-quality (in fact always a vowel-quality):[9] as Patañjali expresses it, it is a generic term comprehending a whole 'family of sounds' (*varṇa-kula*).[10] This function of the term is consistent with its meaning in other contexts, namely 'colour'—a band of the vocalic spectrum. And although the word comes ultimately to designate simply a 'sound-unit', it is noteworthy that Pāṇini's *varṇa-samāmnāya* gives only the short vowel of each quality[1]—an analysis which Pāṇini further supports by his treatment of the long vowels as phonologically equivalent to two short vowels of the same *varṇa*.[2] Whilst we may note also the graphic similarity of the short and long vowels in the Devanāgarī script (अ आ : इ ई : उ ऊ), it is unnecessary to suggest, as Sköld has done, that Pāṇini's listing may have a graphic basis:[3] whether or not Pāṇini knew an established system of writing is still a moot point,[4] but he was certainly too great a linguist to allow orthography to affect his phonological analysis.[5]

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[1] See e.g. Donatus (Keil, iv. 368).

[2] *TP* i. 21. *akāro vyañjanānām*. Cf. Firth, *TPS* 1946, p. 118.

[3] *TP* i. 16–17. *varṇaḥ kārottaro varṇākhyā: akāra-vyaveto vyañjanānām*.

[4] *VP* i. 36. *nirdeśa itinā*.

[5] e.g. *TP* i. 19. *ephas tu rasya*.

[6] *Vaidikābh*. on *TP* i. 19. *riphyate vipāṭyate vastrādi-pāṭana-dhvanivad uccāryata iti rephaḥ*.

[7] i. 34. *upadiṣṭā varṇāḥ* (Uvaṭa: *varṇa-samāmnāye kathitā varṇāḥ*).

[8] Cf. *TP* i. 20. *hrasvo varṇottaras trayāṇām*, on which *Tribhāṣyaratna* has *varṇottaro hrasvo hrasva-dīrgha-plutānām ākhyā bhavati*.

[9] A solitary exception is provided by *Pāṇ*. VII. iv. 53 (*yī-varṇayor*. . . .)

[10] *Mbh*. I. i. 1 (Kielhorn, i. 13), *a-varṇākṛtir upadiṣṭā sarvam a-varṇa-kulaṃ grahīṣyati*. With *varṇa-kula* cf. especially D. Jones, *The Phoneme*, § 22.

Of some interest in this connexion is the indifference to vowel-length in the writing of Latin and Greek; the attempts of early Latin orthographers to introduce double writing (*aa*, &c.) for the long vowels[6] had no lasting success, and a Greek grammatical scholiast, noting that 'there are 24 letters but many more sounds', points out that the single letter α may bear various prosodies of length, aspiration, and tone.[7]

We have now to consider the translation of *varṇa*. In the specialized, suffixal use discussed above it may be adequately represented by 'quality' ('i-quality', &c.); it is its wider usage that presents some difficulty. Whilst it there has much in common with the modern term 'phoneme', no phonemic theory is implied by it, and it would be reading at once too much and too little into the term thus to translate it. The non-committal 'sound-unit', by which we have thus far represented it, suffers from the disadvantage that, unlike *varṇa*, it is restricted to technical usage. A happier rendering, and one which would fit into the Latin terminological tradition, is 'letter'[1]—letters after all come very near to being unselfconscious phonemes.[2] One objection that may be brought against the term is that the *varṇa* of our earlier authors may have possessed no *figura*:[3] and it is true that if they were acquainted with any system of writing, they do not allow it to obtrude itself on their discussion of *potestas*—even at a time when writing was certainly well known and widely employed, reading from a written text was condemned as one of the 'six vilest modes of recitation'.[4] However, it does not seem that the absence or latency of this third attribute need prevent us from using an otherwise convenient term; and we may support it by the fact that when the language does come to be written, each *potestas* and *nomen* of the phoneticians' catalogues receives its appropriate *figura*-label.[5]

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[1] *Śiva-Sūtra* 1–2.

[2] See further 2.10 below.

[3] *Papers on Pāṇini*, p. 21.

[4] A famous but unsatisfactory argument in favour is that of Goldstücker, *Pāṇini*, pp. 13 ff.

[5] Cf. Sten Konow, op. cit., p. 296 ('. . . the term *samāmnāya* indicates a traditional enumeration handed down verbally from teacher to pupil, and not a written list').

[6] Cf. Ritschl, *Opuscula Philologica*, iv. 142 ff.; Lindsay, *The Latin Language*, pp. 9 f.

[7] Schol. on Dionysius Thrax (ed. Hilgard, p. 32 = Bekker, *Anecdota Graeca*, pp. 774 f.).

It remains to mention in this connexion that certain elements discussed by our authors, some of them included in their individual versions of the alphabet, are excluded from the Pāṇinean *varṇa-samāmnāya*: outstanding amongst these are the fricatives **-h** (*visarjanīya*), **-ɸ** (*upadhmānīya*), **-x** (*jihvāmūlīya*), the nasal **ŋ** (*anusvāra*) and the faucal plosives (*yama*)—all of which are bound to a more closely limited series of contexts than the other letters and so are given the title of *parāśraya* or 'dependent'.[6] A further title accorded to them by the *Pāṇinīya-Śikṣā* and certain other treatises presents some difficulty:

> The fricatives **-h**, **-ɸ**, **-x**, *anusvāra* and the *yamas* share the place of articulation of the sounds whereon they depend, and are to be known as '*ayogavāha*'.[7]

The term *ayogavāha* is generally interpreted as meaning 'drawing unyoked' (*a-yoga-*), and is explained by Patañjali as follows:

> . . . because they draw unyoked, i.e. are heard though not mentioned (i.e. though not included in the Pāṇinean *varṇa-samāmnāya*).[8]

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[1] Cf. Abercrombie, 'What is a "Letter"?', *Lingua*, II. I. 54 ff.

[2] Cf. Twaddell, op. cit., p. 54; Meriggi, in *Psychologie du langage*, p. 192; E. Haugen, *First Grammatical Treatise* (Supp. to *Lang*. 26. 4), p. 8.

[3] Cf. Weber, *Ind. St*. iv. 109.

[4] *Sarvasaṃmata-Śikṣā*, 36.

gītī śīghrī śiraḥ-kampī tathā likhita-pāṭhakaḥ
anartha-jño 'lpa-kaṇṭhaś ca ṣaḍ ete pāṭhakādhamāḥ.

[5] Cf. Konow, loc. cit.

[6] *PŚ* 5. *anusvāro visargaś ca ṣka-ṣpau cāpi parāśrayau.*

[7] 22. . . . *ayogavāhā vijñeyā āśraya-sthāna-bhāginaḥ.*

[8] *Mbh*. I. i. 2, on *Pāṇ*. *ŚSū*. 5 (Kielhorn, i. 28): *ke punar ayogavāhāḥ: visarjanīya-jihvāmūlīyopadhmānīyānusvārānunāsikya-yamāḥ: kathaṃ punar ayoga-*

But 'drawing unyoked' seems hardly to be a natural metaphor for 'heard (though) excluded'.[1] Uvaṭa, in his commentary on the *VP*, has an interesting alternative; he takes the initial *a-* of the term not as privative but as referring to the letter **a** and standing for the alphabet as a whole: his explanation then reads,

> They are called *a-yoga-vāha* because they draw, i.e. attain their realization, only when joined with **a**, &c., i.e. with the letters of the alphabet.[2]

In view of this explanation, Weber reads simply *yogavāha* in both text and commentary;[3] but appropriate as the term would be as applying to the contextually bound nature of the elements in question,[4] it is to be noted that the *RT* specifically distinguishes *ayogavāha* (= the contextually dependent elements) from *yogavāha* (= the other letters).[5]

An important terminological distinction underlying a large number of the ancient descriptions is that of *sthāna* and *karaṇa* (lit. 'place' and 'organ'), which, generally speaking, denote the passive and active organs of articulation: as the commentary to the *AP* explains,

> The *sthāna* is that which is approached, the *karaṇa* that which approaches.[6]

The terms closely correspond to what Pike calls 'Point of Articula-

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vāhāḥ: yad ayuktā vahanty anupadiṣṭāś ca śrūyante. There follows a discussion as to which *pratyāhāra* the *ayogavāhas* could be included under, ending with the suggestion that they may belong under none (*athavāviśeṣeṇopadeśaḥ kartavyaḥ*), and Kaiyyaṭa accordingly assumes the title to refer to this lack of a *pratyāhāra* (*ayuktāḥ pratyāhāralakṣaṇena*).

[1] The explanation of the *Pañjikā* (on *PŚ*, loc. cit.) is easier but hardly more acceptable (*na vidyate yogaḥ saṃyogo varṇāntareṇa yeṣām*). Böhtlingk's interpretation (*Pāṇ.* (1840) ii. 413) is fanciful—'Trennung hervorbringend, die Vocale von den Consonanten scheidend, zwischen Beiden in der Mitte stehend.' Wackernagel attributes the strangeness of the term to its having been originally coined for the teaching of children (*Ai. Gr.*, i, p. lxxi, n. 7: 'Dies und der humoristische Charakter mancher Termini wie *ayogavāha-* weisen auf Herkunft aus dem Jugendunterricht').

[2] On viii. 18. *akārādinā varṇa-samāmnāyena sahitāḥ santa ete vahanty ātmalābhaṃ prāpnuvanty ayogavāhāḥ.* For the use of *akārādi*, '*a*, &c.' as = 'abc' cf. Sāyaṇa on *Taitt. Ār.* VII. ii.

[3] viii. 23 ff. Cf. on *PŚ*, loc. cit. (*Ind. St.* iv. 354) and on *Pratijñā Sūtra*, 22.

[4] The greater appropriateness of this term was evidently felt by Canarese grammarians who adopted it instead of *ayogavāha* (see P. S. S. Sastri, *Lectures on Patañjali's Mahābhāṣya*, i. 143 n.). The *Amareśī Ś.* (*ŚS* p. 121, §§ 50–51) has *saṃyogavāha*.

[5] Introd., ed. Shastri, p. 2.

[6] On i. 19, 25. *yad upakramyate tat sthānam: yenopakramyate tat karaṇam.*

tion' and 'Articulator'.[1] In a large majority of cases the articulator is an area of the tongue, viz. 'root of the tongue' (*jihvā-mūla*), 'middle of the tongue' (*jihvā-madhya*) and 'tip of the tongue' (*jihvāgra*), whilst the opposing points of articulation are 'root of the jaw' (*hanu-mūla*), i.e. soft palate, 'palate' (*tālu*) and 'teeth' (*danta*) or 'teeth-roots' (*danta-mūla*). The same classification is extended to the lips, so that in the articulation of the bilabials the *AP*[2] and the *Tribhāṣyaratna*[3] prescribe the lower lip as *karaṇa* and the upper lip as *sthāna*; and the *AP* goes so far as to apply it, somewhat artificially, to infra-buccal articulation in the case of the glottal sounds, for which the 'lower part of the glottis' is considered as the *karaṇa*.[4]

The specification of minor distinctions of *sthāna* in the alveolar area is sometimes not as clear as we could wish, but in the absence, so far as we know, of palatographic aids,[5] this is perhaps hardly surprising. An attempt to apply the system to the feature of nasality can only lead to confusion, the nose in such cases being stated by some treatises to be the articulator and by others the point of articulation.

Other terminological items of less wide application will be discussed under their appropriate headings. The reader is also referred to the excellent glossary now available in vol. iii of Renou's *Terminologie grammaticale du Sanskrit*.[6]

0.43. *Order of Analysis*

The treatment here adopted closely follows that of the Indian analytical procedure, which recognizes three main stages:

i. Analysis of the basic articulatory 'processes'.
ii. Segmental analysis of the speech-stream ('letters').
iii. Synthesis ('prosodic features').[7]

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[1] *Phonetics*, pp. 120 ff.

[2] i. 25. *oṣṭhyānām adharauṣṭham* (sc. *karaṇam*).

[3] On *TP* ii. 39. *atrottaroṣṭha sthānam uttaratva-sāmyād eṣāṃ sthānānām: adharoṣṭhaḥ karaṇam.*

[4] i. 19. *kaṇṭhyānām adhara-kaṇṭhaḥ.*

[5] The first recorded instance appears to be that of an Englishman, J. Oakley-Coles, who in 1871, in the cause of phonetic accuracy, painted the roof of his mouth with a mixture of flour and mucilage (cf. Rousselot, *Principes*, p. 53).

[6] See also K. C. Chatterji, *Technical Terms and Technique of Sanskrit Grammar*, pt. i (Calcutta, 1948).

[7] Cf. J. R. Firth, 'Sounds and Prosodies', *TPS* 1948, pp. 127 ff.; E. J. A. Henderson, 'Prosodies in Siamese: A Study in Synthesis', *Asia Major*, 1. ii. 189 ff.

In (ii), where the individual segments are made the basis of description, the fragmented processes are regarded, by a common but questionable technique of inversion, as 'distinctive features', serving, together with the various articulatory positions, to differentiate one letter from another. Once the basic processes have been described, however, phonetic discussion under heading (ii) is largely confined to the places of articulation.[1]

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[1] Cf. Trubetzkoy's distinction of '*Artikulationsartgegensätze*' and '*Lokalisierungsgegensätze*' (*TCLP* iv. 103 f.).

THE SANSKRIT ALPHABET

(*varṇa-samāmnāya*)

CONSONANTS			*'Glottal'*	*Velar*	*Palatal*	*Retroflex*	*Dental*	*Labial*
Stops	Voiceless	Unaspirated		*k* k	*c* c	*ṭ* ʈ	*t* t	*p* p
		Aspirated		*kh* kh	*ch* ch	*ṭh* ʈh	*th* th	*ph* ph
	Voiced	Unaspirated		*g* ɡ	*j* j	*ḍ* ɖ	*d* d	*b* b
		Aspirated		*gh* gh	*jh* jh	*ḍh* ɖh	*dh* dh	*bh* bh
Nasals[1]				*ṅ* ŋ	*ñ* ɲ	*ṇ* ɳ	*n* n	*m* m
Semivowels					*y* y	*r* r	*l* l	*v* v
Fricatives	Voiceless		*ḥ* -h	(*ḫ*) -x	*ś* ʃ	*ṣ* ʂ	*s* s	(*ḫ*) -ɸ
	Voiced		*h* h					
VOWELS								
Short			*a* a		*i* i	*ṛ* ṛ	*ḷ* ḷ	*u* u
Long			*ā* aa		*ī e* ii e	*ṝ* ṛṛ		*ū o* uu o
Diphthongs					(*e*) *ai* ai			(*o*) *au* au

[1] Also '*anusvāra*'— *ṃ* ɱ
'*anunāsika*'—*m̐* ~

Note. The order of letters as presented in Pāṇini's *Śiva-Sūtra* shows considerable divergences from the above: this fact, however, is explicable by the phonological, as opposed to phonetic, approach there adopted. Cf. Thieme, op. cit., p. 104: 'The arrangement of Pāṇini's list of sounds, which at first looks rather disorderly, is explainable as due to the phonetic catalogue of sounds having been adapted to the practical requirements of the grammar, in which Pāṇini wanted to refer to certain groups of sounds by short expressions.'

PART I

PROCESSES

1.0. *Mental*

THE Indian phoneticians spend but little time in discussing the mental or neural bases of speech. The introductory stanzas of the *PŚ* are representative:

> The soul, apprehending things with the intellect, inspires the mind with a desire to speak; the mind then excites the bodily fire, which in its turn impels the breath. The breath, circulating in the lungs, is forced upwards and, impinging upon the head, reaches the speech-organs and gives rise to speech-sounds. These are classified in five ways—by tone, by length, by place of articulation, by process of articulation and by secondary features. Thus the phoneticians have spoken: take careful heed.[1]

The 'secondary features' here referred to (*anupradāna*) are interpreted by the *Śikṣā-Prakāśa* as '*anunāsikādi*', 'nasality, etc.' (see further 1.10 below).

The musical treatises contain similar statements, though these are less closely related to the actual speech-organism. The relevant passage of the *Saṃgītaratnākara* reads as follows:

> The soul, desirous of expression, instigates the mind; the mind then excites the bodily fire, which in its turn impels the breath. This then . . . moves gradually upwards and produces sound in the navel, the heart, the throat, the head and the mouth. . . .[2]

Parallels to such statements are not far to seek in the west, notably in the doctrine of the Stoics. Zeno is quoted as defining speech in terms of

> a stream of air extending from the principal part of the soul to the throat and the tongue and the appropriate organs,[3]

whilst Aristotle described it as

> the striking against the so-called 'artery' (i.e. trachea) of the air exhaled by the soul.[4]

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[1] 9–10.

. . . teṣāṃ vibhāgaḥ pañcadhā smṛtaḥ
svarataḥ kālataḥ sthānāt prayatnānupradānataḥ
iti varṇa-vidaḥ prāhur nipuṇaṃ tan nibodhata.

[2] I. iii. 3 ff.

[3] Plutarch, *De Plac. Phil.* iv. 21. 903c (πνεῦμα διατεῖνον ἀπὸ τοῦ ἡγεμονικοῦ μέχρι φάρυγγος καὶ γλώττης καὶ τῶν οἰκείων ὀργάνων).

[4] *De Anima*, ii. 420$^{\text{b}}$ (ἡ πληγὴ τοῦ ἀναπνεομένου ἀέρος ὑπὸ τῆς ἐν τούτοις τοῖς μορίοις ψυχῆς πρὸς τὴν καλουμένην ἀρτηρίαν φωνή ἐστιν).

1.1. *Physiological*

A general statement such as that of the *PŚ* also introduces, in a rather haphazard manner, some mention of the basic articulatory processes (*prayatna*) which are more systematically presented by other treatises.

1.10. *Classification*

These processes are divided into two main types, *ābhyantara*, 'internal', and *bāhya*, 'external'. The first type comprises processes occurring within the buccal cavity ('intra-buccal') and the second those occurring elsewhere ('extra-buccal'). For the first type both the *VP*[1] and Pāṇini[2] also use the term *āsya-prayatna*, 'mouth-process': this is interpreted by Patañjali as referring to the area from the lips to the '*kākalaka*',[3] the latter being further identified by Kaiyyaṭa as the thyroid cartilage or 'Adam's Apple'.[4] The Indian classification of the processes may be summarized as follows:

1. *Intra-buccal processes* (*ābhyantara-prayatna*)
    - (*a*) Closure —associated with the class of stops.
    - (*b*) Opening— ,, ,, ,, vowels.
    - (*c*) Constriction, of two degrees, associated with
        - (i) the class of fricatives,[5]
        - (ii) ,, ,, semivowels.
2. *Extra-buccal processes* (*bāhya-prayatna*)
    - (*a*) Glottal —associated with voice and non-voice (breath).[6]
    - (*b*) Pulmonic— ,, ,, aspiration and non-aspiration.[7]
    - (*c*) Nasal — ,, ,, nasality and non-nasality.

Not all our statements adhere rigidly to this descriptive framework, but it may be taken as a generalization of the various systems, and is set out in precisely the above terms by Patañjali[8] and by the *Āpiśali-Śikṣā*.[9] Departures from this system arise when, by the inversion already mentioned, the basic processes are considered as distinctive features serving to differentiate one letter from another. A passage from the *TP* may be quoted in this connexion:

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[1] i. 43 (glossed by Uvaṭa as *mukha-prayatna*).

[2] 1. i. 9.

[3] *Mbh.* 1. i. 4, on *Pāṇ.*, loc. cit. (Kielhorn, i. 61). *oṣṭhāt prabhṛti prāk kākalakāt.*

[4] On *Mbh.*, loc. cit. *grīvāyām unnata-pradeśaḥ.*

[5] Cf. Trubetzkoy's '*Annäherungskorrelation*' (loc. cit.).

[6] Cf. Trubetzkoy's '*Stimmbeteiligungskorrelation*'.

[7] Cf. Trubetzkoy's '*Exspirationsartkorrelation*'.

[8] *Mbh.* 1. i. 4, on *Pāṇ.* 1. i. 9–10, Kielhorn, i. 61 ff.

[9] iii. 1 ff., iv. 1 ff.

> The distinction of letters is effected by secondary features, by combination, by place of articulation, by the position of the articulator, and by length.[1]

The meaning of some of these terms is made clearer by Uvaṭa, who quotes this passage in his commentary on the *RP*;[2] as an instance of 'secondary feature' (*anupradāna*) he mentions the voice-process (2*a* in the above summary); as examples of 'combination' (*saṃsarga*) he gives aspiration and nasality (2*bc*); and he interprets 'position of the articulator' (*karaṇa-vinyaya*) as referring to the intra-buccal processes of closure, opening and constriction (1*abc*), which he exemplifies in the statement,

> Between letters having the same place of articulation and secondary features, e.g. **i**, **y**, **j**, acoustic distinction is effected by the articulator.[3]

But it will be noted that in the *TP*'s statement of 'distinctive features' these processes are treated on the same terms as the places of articulation and a prosodic feature such as length, to which other writers also add tone.[4] This, however, is by no means only an ancient Indian failing: Twaddell, for instance, in his monograph *On Defining the Phoneme*, is prepared to admit as parallel 'component terms of articulatory differences' such various features as places of articulation, duration, and the processes of voice, aspiration, closure, and constriction.[5]

A list of five resonators (*prātiśrutka*) is also given by the *TP*,[6] of which the buccal, pharyngal, and nasal may be justified:[1] the further mention of 'chest' and 'head' as resonators, however, is probably taken over from the subjective terminology used in India, as in the west, for the description of the various voice-registers.[2]

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[1] xxiii. 2.

anupradānāt saṃsargāt sthānāt karaṇa-vinyayāt
jāyate varṇa-vaiśeṣyaṃ parimāṇāc ca pañcamāt.

[2] xiii. 13. Uvaṭa refers to 'distinctive features' by the term *guṇa*, 'quality', which is also used by the *Āp. Ś.* (iv. 7) and the *Mbh.* (Kielhorn, i. 61) to refer particularly to nasality. Both Uvaṭa (on *RP* iii. 2, *VP* iii. 130) and the *Tribhāṣyaratna* (on *TP* i. 1) also use, in connexion with vowels, the term *dharma*, 'property', the vowel itself then being referred to as *dharmin*, 'possessor of a property'.

[3] *tulya-sthānānupradānānām api ikāra-jakāra-yakārāṇāṃ karaṇa-kṛtaḥ śruti-viśeṣaḥ.*

[4] For tone see Uvaṭa on *VP* iii. 130; cf. *Siddhānta-Kaumudī* 12. It is rejected by Patañjali (*Mbh.* 1. i. 4, on *Pāṇ.* 1. i. 9, Kielhorn, i. 62) on the grounds of its non-distinctiveness—*abhedakā udāttādayaḥ.*

[5] p. 45.

[6] ii. 3. *tasya prātiśrutkāni bhavanty uraḥ kaṇṭhaḥ śiro mukhaṃ nāsike iti* (*Tribh.: pratiśrut pratidhvaniḥ*).

We will now examine in detail, and in the order set out above, the statements on the individual processes.

1.11. *Intra-buccal*

Four degrees of closure between *sthāna* and *karaṇa* are recognized. Maximal closure is referred to as *spṛṣṭa*, 'touching', and minimal closure as *vivṛta*, 'opened'.

1.110. *Vowels and Consonants*

The process of minimal closure, or 'non-contact' (*aspṛṣṭa*)[3] provides the phonetic criterion for the distinction of vowels (*svara*) from consonants (*vyañjana*): the *TP* expresses this in the following terms:

> For the vowels the 'place of articulation' signifies the place to which *approximation* is made, and the 'articulator' refers to the organ which effects the approximation. For the rest the 'place of articulation' refers to the place where *contact* is made, and the 'articulator' refers to the organ which effects the contact.[4]

Maximal closure, on the other hand, provides the criterion for the category of stops (*sparśa*).[5]

Thus far no problems arise. But the intermediate degrees of constriction are designated by various terms. The *Āp.Ś.*[1] refers to the four intra-buccal processes as

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[1] Cf. Joos, *Acoustic Phonetics*, pp. 58 f., 96; Forchhammer, *Theorie und Technik des Singens und Sprechens*, pp. 271 ff. (Rachenresonanz, Nasenresonanz, Mundresonanz).

[2] See *TP* xxiii. 10, *PŚ* 36–37; *VP* i. 10, 30. Pike (op. cit., pp. 17 ff.) gives a short critique of the 'imitation-label technique' used in singing-classes: one of the instructions quoted, viz. to 'place the tone between the eyes' finds a close parallel in the '*bhrū-madhya*' of the relevant passage of the *VP*. Cf. Forchhammer, op. cit., p. 276 ('. . . mit dem Begriff der Kopfresonanz verlassen wir das Gebiet der akustisch-physiologischen Erscheinungen und treten auf das Gebiet der Körperempfindungen über'), p. 285 ('Die Brustresonanz muß wohl demnach, genau wie die Kopfresonanz, in die Reihe der gesangtechnischen Verirrungen verwiesen werden').

[3] *PŚ* 38.

[4] ii. 31–34. *svarāṇāṃ yatropasaṃhāras tat sthānam: yad upasaṃharati tat karaṇam: anyeṣāṃ tu yatra sparśanaṃ tat sthānam: yena sparśayati tat karaṇam.*

[5] e.g. *AP* i. 29. *spṛṣṭaṃ sparśānāṃ karaṇam.*

(i) Contact	(*spr̥ṣṭa*)
(ii) Slight contact	(*īṣat-spr̥ṣṭa*)
(iii) Slight openness	(*īṣad-vivr̥ta*)
(iv) Openness	(*vivr̥ta*),

a classification which is reminiscent of our modern terminology for describing degrees of vowel-closure. The *PŚ* employs a rather different set of terms:[2]

(i) Contact
(ii) Slight contact
(iii) Half contact (*nema-spr̥ṣṭa*)[3]
(iv) Non-contact.

The statement of the *AP* provides some difficulty of interpretation. Like the *Āp.Ś.* it mentions (i) contact, (ii) slight contact, and (iv) openness; under (iii), however, we find the words 'and openness' (*vivr̥taṃ ca*):[4] Patañjali, who quotes this statement, is probably right in saying that we must here understand 'slight' (*īṣat*) from the preceding rule, thus bringing the statement into line with that of the *Āp.Ś.*[5] The *AP* commentator, however, suggests that the whole term *īṣat-spr̥ṣṭa* is to be understood,[6] so that (iii) would then read 'slight contact and openness'—a description which is more to the point than it might at first appear (see further I.III below).

To (ii) the *RP* gives the further title of *duḥ-spr̥ṣṭa*, 'imperfect contact'.[7]

Processes (ii) and (iii), like (i) and (iv), provide classificatory criteria, (ii) for semivowels and (iii) for fricatives. The application of this descriptive framework may be exemplified by the palatal series as follows:

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[1] iii.

[2] 38.

aco 'spr̥ṣṭā yaṇas tv īṣan nema-spr̥ṣṭāḥ śalaḥ smr̥tāḥ
śeṣāḥ spr̥ṣṭā halaḥ proktā nibodhānupradānataḥ.

[3] Also *ardha-spr̥ṣṭa* in *Yājñavalkya-Ś.* 209 f., *Varṇaratna-pradīpakā Ś.* 39.

[4] i. 29–32. *spr̥ṣṭaṃ sparśānāṃ karaṇam: īṣat-spr̥ṣṭam antaḥsthānām: ūṣmaṇāṃ vivr̥taṃ ca: svarāṇāṃ ca.*

[5] *Mbh.* I. i. 4, on *Pāṇ.* I. i. 10 (Kielhorn, i. 64). *vivr̥tam ūṣmaṇām īṣad ity eva anuvartate.* The *VŚ*'s description of (iii) as 'open' (294, Lüders, p. 92) suggests a failure to observe this *anuvr̥tti.*

[6] On i. 31.

[7] xiii. 10.

(i) Contact —**c**
(ii) Half contact —**y**
(iii) Half openness—**ʃ** [**ç**]
(iv) Openness —**i**.

1.111. *Fricatives*

One of our treatises gives a more detailed account of the articulation of the fricatives by process (iii). The *TP*, having remarked that 'the fricatives are articulated in the same places as the corresponding stops',[1] goes on to say, 'But the centre of the articulator is open',[2] a statement which lends some support to the view of the *AP* commentator quoted above. Whitney, commenting on this doctrine, makes the criticism that,

> This prescription of an unclosure of the middle of the organ is rather an artificial device for saving the credit of the general prescription of actual contact in all the consonants.

Palatograms showing the articulation of the fricatives by modern Indian speakers would tend to support the *TP*'s observation as against Whitney's uninformed scepticism.[3] In the case of the retroflex fricative the *AP* gives a rather more graphic description by referring to the tongue as 'trough-shaped'[4] (cf. Grammont, on **s**, **z**, '. . . la langue se dispose en forme de gouttière et forme un canal très étroit. . . .[5])

The general term for the fricatives is *ūṣman*, literally 'hot, steaming', perhaps because of their resemblance to the hiss of escaping steam: it is glossed by Uvaṭa as *vāyu*, 'wind'.[6] The term is applied not only to the letters **ʃ ʂ s** but also to **-ɸ -x -h** and **h**,[7] and to the breathy release of the aspirated stops (*soṣman*). There is no special term corresponding to 'sibilant', though excessive sibilation is referred to by the *RP* as *kṣveḍanam*, 'whistling'.[1]

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[1] ii. 44. *sparśa-sthāneṣūṣmāṇa ānupūrvyeṇa.*

[2] ii. 45. *karaṇa-madhyaṃ tu vivṛtam.*

[3] Cf. Prasad, *Bhojpurī*, vol. ii, Palatograms Nos. 2, 68, 69 (**sa:ph**, **a:ʃa:**, **bha:ʂa:**).

[4] i. 23. *ṣakārasya droṇikā.*

[5] *Traité de phonétique*^{3}, p. 69 (see also p. 70, figs. 81–82). Cf. Pike, op. cit., p. 121 ('. . . *grooved*, as for a sibilant . . .'); Sievers, *Gr. d. Phonetik*^{4}, § 314 ('Nicht minder wichtig ist aber, wie es scheint, daß bei ihrer Bildung die Zunge in ihre Mittellinie zu einer schmalen mehr oder weniger tiefen *Rinne* eingekerbt wird.')

[6] On *RP* i. 10. See further K. C. Chatterji, op. cit., pp. 207 ff.

[7] Pāṇini (*Śiva-Sū.* 5) appears to classify **h** also as a semivowel, but as the *Mbh.* points out (1. i. 2, on *Pāṇ.*, loc. cit., Kielhorn, i. 27) this is only for convenience in stating certain phonological rules.

1.112. *Semivowels*

As regards process (ii), with which is associated the class of semivowels, the validity of the analysis is not entirely beyond question, involving as it does the postulation of a greater degree of contact for this class than for the fricatives. In the case of the lateral **l** and the rolled **r** the classification might be justified; but the case for **y** and **v** [**w**][2] is less clear.[3] We should expect the criteria for setting up a category of semivowels to be phonological, and related to the fact that they do not function as sonants[4] in the structure of the syllable; from the phonetic point of view **y** and **w** might be described with the close vowels **i** and **u**,[5] and we may suspect that in erecting a separate phonetic category for them the Indians have been misled by their system of letters. As Pike points out,

> Syllabic contextual function is reflected in phonetic alphabets. Sounds which are described by the same procedure but which are used differently in phonemic systems as syllabics in contrast to non-syllabics are given different symbols, and at times are given names such as 'semivowel' and the like.[6]

The apparent failure of the Indians to recognize the phonological (as opposed to phonetic) basis of this category of letters has the result that whereas **i** is regularly classed as 'open' or 'lacking contact', the corresponding semivowel **y** is described as having 'slight contact'. Regarding the nature of this contact a more specific statement is found in the *TP*:

> For **y** contact is made on the palate by the edges of the middle of the tongue.[7]

The accuracy of this particular statement would in fact be supported by palatographic evidence[1]—it is the description of the vowels that is really at fault, no distinction being generally made between open and close qualities;[2] it should be mentioned, however, that the *TP*, in discussing the **e**-vowel, prescribes some degree of contact, an observation which could again be supported:[3] it is only strange that it should make no such statement with regard to **i**, where the contact is considerably greater.[4] The *TP* also mentions 'approximation of the lips' for the articulation of the lip-rounded vowel **u**.[5] The tradition of the *TP* is followed by the *VŚ*, which refers to lip-protrusion in the case of **u**[6] and, discussing the process of openness generally associated with the class of vowels, points out that this does not apply in the case of **i** and **u**,[7] whilst the next rule goes on to mention actual contact.[8] It is presumably to isolated statements such as these that the *AP* is referring when it gives as the opinion of some sources that contact is involved in the vowels,[9] an opinion which Whitney impatiently dismisses as '. . . too obviously and grossly incorrect, one would think, to be worth quoting'.

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[1] xiv. 20 (Uvaṭa *adhiko varṇasya sarūpo dhvaniḥ*). A further fault in their pronunciation is given the name of *lomaśya*, lit. 'shagginess'; it is interesting that the same metaphor is used in the general Greek term for the aspirates, viz. δασύς.

[2] On the alternative labio-dental articulation see 2.05 below.

[3] See further observations on p. 67, n. 2 below.

[4] Cf. J. R. Firth, 'The Semantics of Linguistic Science', *Lingua*, i. 4, 1948, p. 402; Bloomfield, *Language*, pp. 102 n., 121 ff.

[5] Cf. Pike, op. cit., p. 143.

[6] Op. cit., p. 76; cf. Trager, *Language*, xviii. 220 ff.

[7] ii. 40. *tālau jihvā-madhyāntābhyāṃ yakāre.*

Against the foregoing criticisms of the Indian analysis it may be argued that in certain contexts, more especially as initials, **y** and **v** were more tensely articulated than elsewhere, and involved greater contact than in the case of **i** and **u**; for this we have the specific statements of a number of the Śikṣās,[10] some of which even prescribe for **y** a pronunciation as **j** in such cases[11]—an observation which is significant with regard to later developments.[12] Only on such grounds could the doctrine of a special degree of closure for the semivowels be justified;[1] the earlier treatises, however, quote no such evidence in their defence.

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[1] Cf. Prasad, op. cit., Palatogram No. 89 (ma:ya:).

[2] This shortcoming provides the Latin phoneticians with one of their few triumphs (more especially Terentianus Maurus; cf. Sturtevant, *Pronunciation of Greek and Latin*^{2}, §§ 111 ff.).

[3] Cf. Prasad, op. cit., Palatograms Nos. 99, 100 (abe:, beba:p).

[4] Ibid., Nos. 96, 97 (i:, ima:m).

[5] ii. 24. *oṣṭhopasaṃhāra uvarṇe.*

[6] 284. *uvarṇa-prakr̥ter oṣṭhau dīrghau . . . .*

[7] 294 (Lüders, p. 94).

[8] 295 (Lüders, p. 92, n. 2).

[9] i. 32–33. *svarāṇāṃ ca* (sc. *vivr̥tam*)*: eke spr̥ṣṭam.*

[10] Quoted in detail by Varma, op. cit., pp. 126 ff. See further 3.10 below.

[11] e.g. *Yājñavalkya-Ś.* 150.

pādādau ca padādau ca saṃyogāvagraheṣu ca
jaḥ śabda iti vijñeyo yo 'nyaḥ sa ya iti smr̥taḥ.

Cf. *Pratijñā Sūtra*, 9–13.

I have observed this pronunciation of **y-** in recitation of the *Śuklayajurveda* (*Vājasaneyi-Mādhyandina*), as also a peculiar tense stop realization of **v-** in certain cases (cf. the '*atisaṃspr̥ṣṭaprayatna*' of the gloss on *Yāj. Ś.* 158.)

[12] e.g. Skt. *yava*>Pkt. *java* (>Hindi **jəw**), &c. Cf. also the development

The Sanskrit term for the category of semivowels is *anta(ḥ)sthā*, lit. 'standing between'. It is tempting, and has tempted modern commentators, to interpret this term as referring to the postulated 'intermediate' degree of contact discussed above,[2] or, like our term 'semivowel', to their phonological alternation.[3] The ending *-sthā*, 'standing', however, is more readily applicable to the place which these letters occupy in the alphabet, viz. between the stops and the fricatives;[4] and it is doubtful whether the ancient sources provide evidence for any other interpretation.

A comparison with the ancient western classification is here of some interest. It will first be necessary, however, to mention that the Indians do not set up their vowel-consonant distinction on exclusively phonetic grounds: it has also a phonological basis in the structure of the syllable (see further 3.20 below); from this point of view the vowel is defined by its ability to function as a sonant or syllabic nucleus[5]—as the *RP* observes:

> A vowel with a consonant, or even by itself, forms a syllable,[6]

and it is significant that Patañjali etymologizes the word *svara* ('vowel') as <**svayaṃ rājate* = 'is autonomous'.[7]

In Greece also both types of criteria were employed. Plato mentions the classes of *φωνήεντα* (lit. 'having voice') and *ἄφωνα* (lit. 'lacking voice');[8] these categories, exemplified by Greek vowels and consonants respectively, appear to be set up on a phonological basis, and might be rendered by 'sonant' and 'non-sonant'. Aristotle goes on to relate this phonological distinction to the phonetic criteria of 'non-contact' (*ἀνεῦ προσβολῆς*; cf. Skt. *aspr̥ṣṭa*) and 'contact' (*μετὰ προσβολῆς*; cf. Skt. *spr̥ṣṭa*). Plato further men-

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v->**b**- in Skt. *vana*>Pkt. *vaṇa*>Hindi **bən**, &c. See further S. K. Chatterji, *Origin and Development of the Bengali Language*, i, § 133.

[1] Cf. also palatogram of **y** (in Fr. *yeux*) beside that of **i** given by Grammont, op. cit., p. 77, fig. 95.

[2] e.g. Whitney on *AP* i. 30.

[3] Cf. Renou, *Gr. Sanscr.*, § 5.

[4] Cf. Uvaṭa on *RP* i. 9. *sparśoṣmaṇām antarmadhye tiṣṭhantīty antaḥsthāḥ.*

[5] Cf. Pike, op. cit., pp. 66 f.

[6] xviii. 32. *savyañjanaḥ sānusvāraḥ śuddho vāpi svaro 'kṣaram.*

[7] I. ii. 1, on *Pāṇ.* I. ii. 29–30 (Kielhorn, i. 206). *svayaṃ rājante svarā anvag bhavati vyañjanam.* The word is in fact to be related to the root *svr̥-*, 'sound'.

[8] Cf. also Euripides, *Frag.* 578 (*Palamedes*, 2), 1 f.

tions a sub-category of consonants which have 'noise (ψόφος)[1] but no voice' or 'no voice but some sound (φθόγγος)', and which he elsewhere calls 'intermediate' (μέσα). Aristotle refers to this class as ἡμίφωνα, 'half-sonant', and proceeds to define them by a combination of phonological and phonetic criteria; the 'sonants', he says, are 'without contact and independently pronounceable', the 'non-sonants' are 'with contact and not independently pronounceable', whilst the 'half-sonants' are 'with contact and independently pronounceable'.[2] The only actual example of these 'half-sonants' given by Plato is—rather surprisingly—**s**: to this Aristotle adds **r**, and a full list is given by Dionysius Thrax, followed by Dionysius of Halicarnassus, viz. **s, z, l, r, m, n.**[3] Thus the Greek 'half-sonants' turn out to be the fricatives, the liquids and the nasals: in the absence of **l** or **r** vowels and (in Attic-Ionic) of **y** or **w** glides, the question of a phonological category of 'semivowels' (the usual translation of ἡμίφωνα)[4] does not arise. We are here in fact dealing not with semivowels but with 'continuants' of various types, some of which may have quasi-syllabic function outside the Greek phonological system—as Dionysius Thrax expresses it,

> They are called 'half-sonant' in that, when used in murmurings and hissings, they are only less sonorous (εὔφωνα) than the 'sonants'.[5]

And it is noteworthy that the Latin grammarians generally include amongst their '*semivocales*' the Latin fricative **f**,[6] but not the semivowels **y** and **w** (*j*, *v*).[7] Some Greek sources seem also to have classified as 'half-sonant' the **h**-element of the voiceless aspirates **ph, th, kh** (φ, θ, χ):[8] the inclusion of the aspirate **h-** is rejected by

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[1] Cf. the German use of the term 'Geräuschlaut' (e.g. Dieth, *Vademekum der Phonetik*, §§ 200 ff.); see also Bloomfield, *Language*, p. 95.

[2] The relevant passages from Plato and Aristotle are: Plato: *Crat.* 424C; *Phil.* 18B f.; *Theaet.* 203B. Aristotle: *Poet.* xx. 1456^{b}, 1457^{a}; *Hist. An.* iv. 9. 535^{a}.

[3] Ed. Uhlig, pp. 11 f. = Bekker, p. 631. *ἡμίφωνα μὲν ὀκτώ, ζ (= σδ or δσ), ξ (= κσ), ψ (= πσ), λ, μ, ν, ρ, σ.* Cf. D. Hal., *De Comp.* 72 f., 78 ff.

[4] Cf. Marouzeau, *Lexique de la terminologie linguistique*, p. 192.

[5] Loc. cit.
ἡμίφωνα δὲ λέγεται, ὅτι παρόσον ἧττον τῶν φωνηέντων εὔφωνα καθέστηκεν ἔν τε τοῖς μυγμοῖς καὶ σιγμοῖς.

[6] See e.g. Donatus, Keil, iv. 367; Priscian expressly disagrees with this inclusion (Keil, ii. 9, 11).

[7] Ibid., 13.

[8] Cf. Sextus Empiricus, *Adv. Gramm.* (*Math.* i), 102. It is also to be noted that in the list of Diogenes Babylonius the aspirates are not included amongst the stops (cf. Diog. Laert. vii. 57). Attempts have been made to explain this classification by assuming an affricate or fricative realization (cf. Sturtevant, op. cit., § 90a;

Priscian,[1] but appears again in the Old Icelandic grammatical treatises, which also include the Icelandic dental fricatives.[2]

The Greco-Roman tradition of the '*semivocalis*' still finds expression in the work of Grammont:

> Les semi-voyelles sont encore éminemment des spirantes et aussi bien des fricatives et des constrictives.[3]

There is in fact little common ground between the Indian approach to the *antaḥsthā* and the Greek approach to the *ἡμίφωνον*. The only mention in our Indian sources of a contrast between instantaneous and continuous articulation is that of the *RP*:

> For the stops there is momentary contact: for the vowels and fricatives there is continuous non-contact;[4]

and the only Western statement of a special degree of contact is that of Marius Victorinus:

> Semivocales in enuntiatione propria ore semicluso strepunt.[5]

Our own term 'semivowel' has its origin in the Greek *ἡμίφωνον*, through the medium of the Latin *semivocalis*, whilst its employment, though not its justification, generally corresponds more closely to that of the Sanskrit *antaḥsthā*.

It is further to be noted that our term 'liquid', a word more convenient than descriptive, owes its origin to the west rather than the east. The Greek term *ὑγρός*, lit. 'moist', 'fluid' (translated by the Latin *liquidus*) is first used in a phonetic sense by Dionysius Thrax, who applies it to the Greek **l**, **r**, **m**, **n**:[6] most of his commentators interpret the word as meaning 'slippery', i.e. 'unstable', with reference to the metrical effect of these sounds as second members of a group stop+liquid, where a preceding syllable containing a short vowel is of 'doubtful' quantity, a state also referred to as *ὑγρός*.[7] Terentianus Maurus, however, explains the term as referring to their 'lubrica natura', in that they may function either

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Blass, *Pron. of Ancient Greek*, trsl. Purton, pp. 101 ff.); but such a pronunciation cannot be supported so early as second century B.C.

[1] Loc. cit.

[2] Cf. *Codex Upsaliensis*, ed. Dahlerup & Jónsson, pp. 61, 65.

[3] Op. cit., p. 77.

[4] xiii. 9, 11. *spr̥ṣṭam asthitam: svarānusvāroṣmaṇām aspr̥ṣṭaṃ sthitam.*

[5] Keil, vi. 32.

[6] Ed. Uhlig, p. 14 = Bekker, p. 632.

[7] Hilgárd, pp. 46, 342; Bekker, pp. 816 ff. Cf. Priscian, Keil, ii. 9; Max. Victorinus, Keil, vi. 216.

as vowels or as consonants[1]—a remarkable interpretation as applied to the phonological systems of Greek or Latin.[2] Atilius Fortunatianus sees in the term a reference to lack of tenseness (*quae minus virium habeant*);[3] and other interpreters of Dionysius Thrax refer simply to their 'smooth and even articulation'.[4]

'Liquid' is in fact one of those terms of which Grammont has said,

> 'Elles sont consacrées par un long emploi, grâce auquel le lecteur sait immédiatement de quoi l'on veut parler; des appellations nouvelles pourraient être plus adéquates sans offrir le même avantage.'[5]

1.113. *Retroflexion*

Amongst the intra-buccal articulatory processes we might have expected the Indians to have mentioned one further feature, namely, retroflexion. This, however, is generally discussed by them in connexion with the places of articulation (see 2.03), and also in relation to its prosodic function (see 3.10). To consider the retroflex articulations on the same terms as the velars, palatals, dentals, or labials is, even from the point of view of the Indian descriptive framework, not entirely justified.

In the *TP* we find a prescription regarding the position of the articulators in their quiescent or 'neutral' state (a close parallel to Sievers' 'Ruhelage'[6] or 'Indifferenzlage'):[7]

> . . . the tongue is extended and depressed, and the lips are in the position for **a**.[8]

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[1] Keil, vi. 350.

. . . Graecus udas nominat:
lubrica est natura in illis namque et alternus vigor:
nunc enim vocalis usum, nunc ministrat consonae.

[2] More justifiable is Macdonell's use of the term (*Skt. Gr.*, p. 11, § 17, B. 1, on Skt. **i**, **u**, **ṛ**, **ḷ**)—'Vowels which are liable to be changed into semivowels . . . liquid vowels'. Cf. Renou, *Gr. Sanscr.*, § 5.

[3] Keil, vi. 279.

[4] Hilgard, p. 46; Bekker, p. 817: cf. Psellus ap. Boissonade, *Anec. Gr.* iii. 213, and also ps.-Aristotle, *De Audib.* 803^{b}. Cf. also Jakobson, 'Observations sur le classement phonologique des consonnes' (*Proc. 3rd Int. Cong. Phon. Sc.*), p. 40: 'Il semble que c'est le fait du *glissement* qui est décisif pour l'impression acoustique des consonnes en question'.

[5] Op. cit., p. 71.

[6] *Gr. d. Phonetik*^{4}, § 55.

[7] *Gr. d. Lautphysiologie*, p. 15; cf. also Sweet's 'Organic Basis' (*Primer*, §§ 184 ff.) and Viëtor's 'Artikulationsbasis' (*Elem. d. Phon.*^{5}, §§ 128 ff.)

[8] ii. 20–21. *anādeśe praṇyastā jihvā: akāravad oṣṭhau*, on which *Tribh.*, *yatra . . . anādeśas tatra . . . jihvā . . . tūṣṇīm-bhūtā bhavati* (cf. Sievers, 'Die Zunge liegt schlaff in der Mundhöhle').

In this condition the velar, palatal, dental, and labial articulators are approximately opposite their respective places of articulation, and the utterance of these series is effected simply by means of the closure-processes already discussed.[1] This, however, is not the case with the retroflex series, which is articulated, as our treatises recognize, 'by rolling back the tip of the tongue'[2]—that is to say, the place of articulation is not automatically determined by the application of the closure-processes to the apical articulator:[3] there is need of a further *prayatna*, 'articulatory effort', which might with consistency have been included at this point.[4]

1.12. *Extra-buccal*

1.120. *Glottal*

In their recognition of the voicing process the Indian phoneticians make one of their greatest single contributions. The term for 'voiced' (*ghoṣavat*) is, as we have already seen, found in early non-technical literature, and the specialist discovery is likely to have been of even earlier date. To designate the glottis the Indians use either the word *kaṇṭha*, which in non-technical usage means simply 'throat', or more specifically *khaḥ* (or *bilaṃ*) *kaṇṭhasya*, 'aperture of the throat'. In the Indian musical literature we also find the picturesque term *śārīrī vīṇā*, 'bodily lute',[5] which some authorities have interpreted as referring to the vocal cords;[6] in a recent paper, however, Dr. A. A. Bake has pointed out that this interpretation is unfounded, and that 'strange to say, there is no trace of the knowledge of the existence of the vocal cords in the texts on the theory of music'.[7] The following are typical of the phonetic statements:

The air, respiration, or pulmonic emission, at times of vocal activity,

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[1] Cf. Sievers, *Phon.*, § 57: 'Die Ruhelage des Sprachorgans ist die natürliche Basis für die einzelnen Articulations-bewegungen, welche zur Bildung von Sprachlauten führen.'

[2] e.g. *TP* ii. 37. *jihvāgreṇa prativeṣṭya mūrdhani ṭavarge.* *AP* i. 22. *mūrdhanyānāṃ jihvāgraṃ prativeṣṭitam.* *VP* i. 78. *mūrdhanyāḥ prativeṣṭyāgram.*

[3] The *VŚ* alone suggests this basic distinction (288–9):

kavargādiṣu jihvādi-madhyāntoṣṭhena copari:
ṭavarge vaktra-madhyena jihvāgreṇa yathā spṛśet.

Cf. Lüders, pp. 92, 94.

[4] Note Trubetzkoy's inclusion under '*Eigentongegensätze*' (*TCLP* iv. 103 f.).

[5] e.g. *Saṃgītadarpaṇa*, i. 48. Cf. also *Ait. Ār.* iii. 2. 5.

[6] Cf. J. Grosset in Lavignac, *Encyclopédie de la musique*, i. 285.

[7] In a paper 'The Anatomical Background of Indian Music', read at the Leyden Congress of Orientalists, June 1950.

> becomes breath (*śvāsa*) or voice (*nāda*) according as the glottis is open or closed.[1]
>
> When the glottis is closed, voice is produced; when it is open, breath.[2]

The words used to refer to the two poles of this articulatory process are *saṃvṛta*, 'contracted, closed', and *vivṛta*, 'opened': it will be remembered that the latter term was also used in the description of the intra-buccal processes.

As regards the relationship of the voicing process to the various letters, the *AP* states,

> Breath is emitted in the case of the voiceless consonants, and voice in the case of the voiced consonants and the vowels.[3]

The *Mbh.* also notes the effect of the voicing process on intervocalic 'voiceless' stops, saying of the **c** in a word such as **pacati**,

> It is overlaid by the voicing of the preceding and following vowels,[4]

a feature which is further supported by the statements of the Prakrit grammarians.[5]

Apart from the two poles of 'breath' and 'voice', a number of treatises introduce a further factor into their descriptions; the *RP* observes that,

> When the glottis is in an intermediate condition (between closed and open) both breath and voice are produced,[6]

and goes on to relate this feature to the individual letters as follows,

> Breath is emitted for the voiceless sounds and voice for the others, except for the voiced fricative (**h**) and the voiced aspirates, where both breath and voice are emitted.[7]

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[1] *RP* xiii. 1–2. *vāyuḥ prāṇaḥ koṣṭhyam anupradānaṃ kaṇṭhasya khe vivṛte saṃvṛte vā āpadyate śvāsatāṃ nādatāṃ vā vaktrīhāyām.*

[2] *TP* ii. 4–5. *saṃvṛte kaṇṭhe nādaḥ kriyate: vivṛte śvāsaḥ.* Whilst *ghoṣavat*, *aghoṣa* are generally used for 'voiced', 'voiceless', the usual term for voice is *nāda* and not *ghoṣa;* this fact leads to misunderstanding on the part of later writers, who list *nāda* and *ghoṣa* as separate processes—e.g. *Siddh. Kaum.* 12.

[3] i. 12–13. *śvāso 'ghoṣeṣv anupradānaḥ: nādo ghoṣavat-svareṣu.*

[4] I. iv. 4, on *Pāṇ.* I.iv. 109 (Kielhorn, i. 355). *pūrva-parayor hrādena pracchādyate*; cf. Kaiyyaṭa, *dvayor akārayor ghoṣavator madhye cakāro ghoṣavān iva lakṣyata ity arthaḥ.*

[5] Nitti-Dolci, *Les Grammairiens Prakrits*, pp. 151 ff.; cf. Bloch, *L'Indo-Aryen*, pp. 77 f.

[6] xiii. 2. *ubhayaṃ vāntarobhau.*

[7] xiii. 4–6. *śvāso 'ghoṣāṇāṃ: itareṣāṃ tu nādaḥ: soṣmoṣmaṇāṃ ghoṣiṇāṃ śvāsanādau.*

This is supported by the statements of the *TP*, viz.

> When the glottis is in an intermediate condition, 'h-sound' is produced;[1]
>
> For vowels and voiced (unaspirated) consonants the emission is voice, for voiceless consonants breath, and for **h** and the voiced aspirates 'h-sound'.[2]

Further, the *RP* condemns as a fault in the pronunciation of **h** 'excessive breath or similarity to a voiceless sound'.[3]

Regarding this third category of glottal 'half-closure' or 'h-sound', Max Müller remarks,

> Dies ist eine indische Vorstellung, welche wohl nicht zu rechtfertigen ist,[4]

and Whitney in a series of unsympathetic comments,

> I confess myself unable to derive any distinct idea from this description, knowing no intermediate utterance between breath and sound. . . .
>
> (The *RP*) declares both breath and sound to be present in the sonant aspirates and in *h*, which could not possibly be true of the latter, unless it were composed, like the former, of two separate parts, a sonant and a surd; and this is impossible.[5]
>
> . . . The attempt to establish this distinction is forced and futile. . . . That intonated and unintonated breath should be emitted from the same throat at once is physically impossible.[6]

Needless to say, the two western scholars were wrong. The modern Indo-Aryan languages bear ample evidence, if evidence were needed, that the aspiration of the voiced aspirates (**ĝh, jh,** &c.) is voiced aspiration,[7] and there are strong historical and phonological reasons for believing the Sanskrit **h** to have been 'voiced h' [ɦ];[8] the possibility of such an articulation is no longer a matter of doubt—to quote one of many available descriptions:

> A voiced **h** can be made. For this sound the vocal cords vibrate along

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[1] ii. 6. *madhye hakāraḥ.*

[2] ii. 8–10. *nādo 'nupradānaṃ svara-ghoṣavatsu: hakāro ha-caturtheṣu: aghoṣeṣu śvāsaḥ.* Cf. i. 12–14. *ūṣma-visarjanīya-prathama-dvitīyā aghoṣāḥ: na hakāraḥ: vyañjana-śeṣo ghoṣavān.*

[3] xiv. 28. *śvāso 'ghoṣa-nibhatā vā hakāre.*

[4] On *RP* 710.

[5] On *AP* i. 13.

[6] On *TP* ii. 6.

[7] See e.g. J. R. Firth in Harley, *Colloquial Hindustani*, p. xxi.

[8] e.g. **h**<**ĝh* in *hima* (beside Av. *zima*, &c.). Within Sanskrit cf. alternations such as *ghnanti/hanti*, *dhā-/hita*, &c., and junctions of the type *tat+hi = taddhi.* Cf. Thumb, *Handbuch des Sanskrit*, § 54.2; Edgerton, *Skt. Hist. Phonology*, §§ 45 f.

a considerable part of their length, while a triangular opening allows the air to escape with some friction.[1]

The failure of early western phonetics to take note of the voicing process has already been suggested. Aristotle, in a passage of his *Historia Animalium*,[2] in fact comes nearer to its discovery than is generally recognized: in making the distinction between vowels and consonants he says that whereas the latter are produced by the tongue and lips, the former are produced 'by the voice and larynx'. But the matter is not further pursued by him or his successors, and the western tradition is really that which begins with Dionysius Thrax; the latter distinguishes the three classes of Greek stops (voiceless, voiced, voiceless aspirate) by their degrees of 'aspiration', viz. as 'smooth', 'medium', and 'rough' respectively,[3] the voiced stops being considered from this point of view as intermediate between the voiceless unaspirated and the voiceless aspirated stops. It is difficult to see how this classification can have been justified: Sturtevant has now rightly abandoned an earlier theory that the statement could refer to a *lenis/fortis* distinction;[4] and another hypothesis, which would to some extent fit Dionysius' classification, namely, that the Greek *β*, δ, *γ* represented voiced aspirates, is supported by no positive evidence whatever.[5]

But whether or not this description was ever applicable to Greek, it was evidently not in the case of Latin, and with one notable exception is not taken over by the otherwise ovine Latin grammarians. The responsibility for transmitting to us the still familiar Latin translation of the Greek terms—*tenuis*, *media*, and *aspirata*[6] —must be borne by Priscian, who takes over the Greek classification in its entirety. Undaunted by the fact that Latin possesses no *aspiratae*, he applies the term to the Latin *fricative* **f**, which he identifies with the Greek ϕ[1] (the latter having by his time probably developed its present fricative value). The ambiguity which the term thus developed was ultimately to provide Jacob Grimm with a deceptive symmetry in his famous statement of the *Lautverschiebung*.[2]

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[1] Westermann and Ward, *Practical Phonetics for Students of African Languages*, § 250 (with diagram).

[2] iv. 9. 535*a* (τὰ μὲν οὖν φωνήεντα ἡ φωνὴ καὶ ὁ λάρυγξ ἀφίησιν, τὰ δὲ ἄφωνα ἡ γλῶττα καὶ τὰ χείλη).

[3] Ed. Uhlig, p. 12 f. = Bekker, p. 631: *Τούτων ψιλὰ μὲν τρία, κ, π, τ, δασέα δὲ τρία, θ, φ, χ, μέσα δὲ τούτων τρία, β, δ, γ. μέσα δὲ εἴρηται, ὅτι τῶν μὲν ψιλῶν ἐστὶ δασύτερα, τῶν δὲ δασέων ψιλότερα.* Cf. Dion. Hal., *De Comp.* 83; Aristides Quintilianus, pp. 29, 54 Jahn.

The δασέα/ψιλά distinction is in fact found earlier in Ps.-Aristotle, *De Audibilibus* 804^{b}.

[4] Op. cit., p. 86, n. 89.

[5] Ibid., § 94.

[6] The Latin translations *tenuis* and *aspirata* (for Gk. ψιλή, δασεῖα) are remarkable: we should expect *lenis* and *aspera* (cf. *spiritus lenis/asper* for πνεῦμα ψιλόν/δασύ).

As regards the nature of the distinction between the voiced and voiceless Latin stops, the ancient writers seem to have had only the vaguest impressions. With **t** and **d** there is the suggestion of a different place of articulation[3]—a method of differentiation that we find perpetuated in Ben Jonson's *English Grammar*. The learning of the distinction is recommended by Quintilian as an essential item in a boy's education,[4] but he guardedly omits to discuss the matter in detail. In a description by Terentianus Maurus, dealing with the distinction between **b** and **p**, **g** and **k**, there is a suggestion, though obscurely expressed, that the author had recognized the extremely important *lenis/fortis* opposition (which Whitney was rather too ready to dismiss);[5] and Marius Victorinus, paraphrasing this statement, does in fact use the former term.[6] But any good that may have resided in these descriptions quickly perished; the medieval grammarian Hugutio distinguishes *aliquando* from *aliquanto* by the position of the stress,

> licet enim *d* et *t* sint diversae litterae, habent tamen adeo affinem sonum, quod ex sono non posset perpendi aliqua differentia;[7]

and in the seventeenth century John Wallis states the distinctive feature to be nasality.[8] Only in the latter part of the nineteenth century, under the influence of Indian teaching, does the recognition of the voicing process make headway.

1.121. *Pulmonic*

It will be convenient to consider next the process of aspiration, in as much as one of our treatises, the *PŚ*, links this with the voicing process:

> **h** and the voiced aspirates are voiced, the semivowels and voiced stops

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[1] Keil, ii. 20: 'Inter *c* sine aspiratione et cum aspiratione est *g*, inter *t* quoque et *th* est *d*, et inter *p* et *ph* sive *f* est *b*. Sunt igitur hae tres, hoc est *b*, *d*, *g*, mediae, quae nec penitus carent aspiratione nec eam plenam possident.'

[2] For discussion cf. Jespersen, *Language*, p. 44.

[3] e.g. *Mar. Vict.*, Keil, vi. 33.

[4] I. iv. 16.

[5] Cf. 'On the Relation of Surd and Sonant', *Trans. Am. Phil. Assn.* 1877, pp. 41 ff.

[6] For texts see Sturtevant, op. cit., § 189*a*.

[7] Haase, *De Medii Aevi Studiis Philologicis*, p. 34.

[8] *Grammatica Linguae Anglicanae*, pp. 15 f.

> are partly voiced; the voiceless aspirates are breathed, the voiceless stops are partly breathed. This is the law of speech.[1]

In other words, **h** and the voiced aspirates are considered as more fully voiced than the non-aspirates, and the voiceless aspirates more fully breathed than the non-aspirates. In the case of the voiceless pair the statement makes good sense when we consider *śvāsa*, 'breath', as referring to 'force of voiceless breath' rather than simply 'voicelessness'. This interpretation is supported by the statement of the *TP* that,

> More breath is emitted in the other voiceless consonants (i.e. the aspirated stops and the fricatives)[2] than in the unaspirated stops,[3]

and is in accordance with the grammatical and later phonetic terminology of the distinction between aspirate and non-aspirate, namely '*mahā-prāṇa*', lit. 'big-breath', and '*alpa-prāṇa*', lit. 'little-breath'.[4]

If we now turn to the *PŚ*'s statement regarding the voiced pair, similar considerations apply: *nāda*, 'voice', being interpreted as 'force of voiced breath', the statement implies greater breath-force on the release of the aspirates than of the non-aspirates. The justification for such a statement is clearly reflected in kymographic tracings, where the voiced breath correlates with a particularly high amplitude in the vocalic wave-forms;[5] from this point of view **h** and the release elements of the voiced aspirates may be considered as an 'overblowing' of the following vowel[6] (cf. also 2.00 below).

The Indian treatment of the aspiration-process provides little else for discussion, with the exception of a statement in the *RP* that,

> Some say that the aspiration of the aspirates consists of a homorganic fricative,[7]

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[1] 39–40.

. . . nādino ha-jhaṣaḥ smṛtāḥ
īṣan-nādā yaṇ jaśaś ca śvāsinas tu kha-phādayaḥ
īṣac-chvāsāṃś caro vidyād gor dhāmaitat pracakṣate.

[2] Cf. Plato, *Crat.* 427*a* (- - - τοῦ φεῖ καὶ τοῦ ψεῖ καὶ τοῦ σῖγμα καὶ τοῦ ζῆτα, ὅτι πνευματώδη τὰ γράμματα).

[3] ii. 11. *bhūyān prathamebhyo 'nyeṣu.* The *VŚ* (280, 282: Lüders, p. 95) gives to this special degree of breathiness the title of *arka*.

[4] e.g. *Mbh.* 1. i. 4, on *Pāṇ.* 1. i. 9 (Kielhorn, i. 61); *Āp. Ś.* iv. 3 ff. Cf. A. C. Sen, *Proc. 2nd Int. Cong. Phon. Sc.*, p. 192.

[5] Cf. Prasad, op. cit., Kymograms Nos. 85, 92 (ḡho:ḡhar, bhabhu:t).

[6] Cf. Pike, op. cit., pp. 71 f.; Doke, *Comp. Study in Shona Phonetics*, p. 92.

[7] xiii. 16. *soṣmatāṃ ca soṣmaṇām ūṣmaṇāhuḥ sasthānena.*

a view that is repeated for the voiceless aspirates by the *Āp.Ś.*[1] The breathy release of an aspirated stop inevitably has, as Sweet observed, 'something of the character of the preceding consonant';[2] and, in the voiceless series at least, varying degrees of affrication are to be heard from speakers of some modern Indo-Aryan languages. Dialectal pronunciations of this type are likely to have existed in the case of Sanskrit; the later development of the aspirates, however, hardly supports Uvaṭa's assumption of a strongly affricated pronunciation (**pɸ, ts, kx**) such as is attested in, for example, High German.

1.122. *Nasal*

The nasalization process may occur in combination with various intra-buccal processes, and the ancient statements regarding the mode of combination for the most part present no great difficulty of interpretation. The nasal consonants are referred to either as *nāsikya*, 'nasal', or *anunāsika*, 'having a nasal component'. Of the mechanism of the process the *TP* says simply that,

> Nasality is produced by opening the nasal cavity.[3]

Our phonetic treatises, as also Pāṇini, realize that both nose and mouth are involved,[4] and the *TP* further points out that the articulator is as for the corresponding oral consonants.[5] Applied to the stop series (*sparśa, spṛṣṭa*) this process gives rise to the nasal consonants **ŋ, ɲ, ɳ, n, m**: nasalized forms of three of the semivowles, **ỹ, l̃, ṽ**, are also attested as junctional features in Vedic Sanskrit and duly noted by the phoneticians.[6]

In connexion with the vowels the working of the process is similarly quite clear. Here again the term *anunāsika* is regularly used, as opposed to the *śuddha* or 'pure' non-nasalized vowels.[1] Another term, however, is also used by some of the treatises, namely *rakta*, 'coloured', nasalization being referred to as *rāga* or *raṅga*, i.e. '(nasal) colour'.[2] Some of our authors give picturesque descriptions of the quality of these vowels: the account in the *Sarvasaṃmata-Śikṣā* is as follows:[3]

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[1] iv. 9. *sasthānena dvitīyāḥ.*

[2] *Primer*, p. 59; cf. Pike, op. cit., p. 113.

[3] ii. 52. *nāsikā-vivaraṇād ānunāsikyam.*

[4] *AP* i. 27. *anunāsikānāṃ mukha-nāsikam.*
VP i. 75. *mukha-nāsikā-karaṇo 'nunāsikaḥ* (cf. i. 89).
Pāṇ. 1. i. 8. *mukha-nāsikā-vacano 'nunāsikaḥ.*

[5] ii. 51. *vargavac caiṣu.*

[6] Cf. *TP* v. 28. *antasthā-paraś ca savarṇam anunāsikam.*

e.g. **saỹyudhi** for **sam+yudhi**
suvarɡal̃ lokam for **suvarɡam+lokam**
yajɲaṽ vaʂʈu for **yajɲam+vaʂʈu**

Only **l̃** is found in Classical Sanskrit (and only when = phonological **-n**). **r̃** is not attested (see, however, Konow, op. cit., p. 309); this is in accordance with the non-occurrence of geminate **r** (cf. junctions of the type ***-iʂ+r->-ii r-** for expected ***-irr-**).

> The nasal colour should arise from the heart,[4] with a sound like that of bells: just as the milkmaids of Surāṣṭra cry '**takrããããã**' ('buttermilk!'), so should the nasality be realized.

The nasalized vowels are not of frequent occurrence. They appear in certain types of junction (e.g. **trĩĩr ekaadaʃãã iha** for **triin+ekaadaʃaan+iha**),[5] and as features of finality in the sentence or breath-group.[6] Apart from such cases there was a tendency, censured by the *RP* but general in the modern Indo-Aryan languages, for vowels to take on some degree of nasal 'colour' in contact with nasal consonants.[7]

But apart from the above, the accounts given by our treatises, as also the system of writing, present us with a third sub-category of the nasalization process. The name which this third feature bears is '*anusvāra*' (*ṃ*, **ŋ**), which might be literally translated either as 'after-sound' or 'subordinate-sound'. The contexts in which it may occur are clearly defined. It is restricted to post-vocalic position, and its primary context is before the fricatives **ʃ**, **ʂ**, **s** (and also **h**), in cases where historical and phonological evidence point to an alternation with **m** or (medially) **n**;[8] at an early date it also made its appearance under certain conditions before **r**,[9] and in Classical Sanskrit replaces the Vedic **ỹ** and **ṽ** before **y** and **v** respectively (see above). Its optional use is further extended, even as early as Pāṇini, to word-final position preceding a stop,[1] where previous phonetic teaching had prescribed a homorganic nasal;[2] later treatises extend this practice to morpheme-junctions within the word, and even to intra-morphemic position,[3] being followed in this last extension by the graphic practice of manuscripts and of some printers. In Prakrit it is further extended to the position before an initial vowel.[4]

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[1] *AP* iv. 121; *Varṇapaṭalam* iii. 5.

[2] e.g. *RP* i. 36. *rakta-saṃjño 'nunāsikaḥ.*

[3] 48.

kāṃsya-dhvani-samaṃ raṅgaṃ hṛdayād utthitaṃ bhavet
yathā saurāṣṭrikā nārī takrā̃4 ity abhibhāṣate
evaṃ raṅgāḥ prayoktavyāḥ. . . .

Cf. Varma, op. cit., pp. 149 f.

[4] The *Cārāyaṇīya-Śikṣā* has, more realistically, *nāsād utpadyate raṅgaḥ. . .*

[5] Cf. also the so-called *anunāsikopadhā vivṛtti* (*RP* ii. 67), e.g. **sacãã indrah** for **sacaa+indrah**.

[6] Cf. *RP* i. 63. *aṣṭāv ādyān avasāne 'pragṛhyān ācāryā āhur anunāsikān svarān.* *Sarvasaṃmata-Śikṣā* 46. *pluto 'varṇaḥ padānta-stho nāsikyo raṅga-saṃjñakaḥ.*

[7] *RP* xiv. 56. *raktai rāgaḥ samavāye svarāṇām.* Cf. also xiv. 9.

[8] Cf. **taŋ sarvam** beside **tam api**, &c., **haŋsa** beside Germ. *Gans*, Gk. *χήν*, &c. (**ĝhans-*).

[9] Ved. **samraaʈ** beside **saŋsat**, &c. suggests the posteriority of the sequence **-ŋr-** (cf. Wackernagel, op. cit., § 283*c*).

The phonetic value of this feature, however, has provided a problem for phoneticians and commentators whether ancient, medieval, or modern. Some confusion may perhaps be avoided by first considering the evidence for its pronunciation in the earlier and more limited contexts, namely, before the fricatives. Sequences of the type **-VɱS-** (where **V** = any vowel and **S** = any fricative) were phonologically parallel to sequences of the type **-VL̃L-** (where **L** = any semivowel except **r**) or **-VNT-** (where **T** = any stop and **N** = homorganic nasal): **saɱ-skr̥ta,** for example, is parallel to **sal̃-laya** and to **san-taana, sam-paata,** &c. Thus the nasality in the types **-VL̃L-** and **-VNT-** conforms to both the *sthāna* and the *ābhyantara-prayatna* of the following consonant; by its parallelism with these sequences one might also make the theoretical supposition that **-VɱS-** = **-VZ̃S-** (where **Z̃** is a nasalized fricative), a form of realization that may be heard, for example, in Modern Icelandic, where in a phrase such as *sólin skín fegurst* the word-junctions are realized with some overlapping of the nasalization and friction processes (in a segmental representation **-z̃ s-**, **-ṽ f-**).[5] In only one Indian statement, however, is there any implication that **ɱ** is to be considered as a fricative.[6]

In a number of languages the tendency is in fact for the nasality in such contexts to be realized in the preceding vowel,[7] and for the syllabic quantitative pattern to be maintained by a lengthening of the vowel; as Sweet long ago pointed out with regard to Latin,

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[1] viii. iv. 59.

[2] Cf. *TP* v. 27. *makāraḥ sparśa-paras tasya sasthānam anunāsikam.*

[3] Cf. *Sarvasaṃmata-Ś.* 32 (e.g. **saɱ-ɟɲaanam, daɱkʂɳu**).

[4] Cf. Pischel, § 348 (Hemacandra, i. 24).

[5] Cf. Stefán Einarsson, *Icelandic Grammar*, pp. 19, 29; *Beiträge zur Phonetik der Isländischen Sprache*, p. 18. Note also Petrovici, *De la nasalité en Roumain*: 'Ce n'est pas seulement le lieu d'articulation qui devient identique à celui de la consonne suivante, mais aussi le mode d'articulation.'

[6] *RP* i. 10, with Uvaṭa's comment. On the general rareness of nasal fricatives cf. Grammont, *Traité*, p. 95; Martinet, *TCLP* viii. 282; and on the incompatibility of friction and voice in Skt. cf. p. 44, n. 4.

[7] Cf. especially the development in Avestan (Bartholomae, *Gr.* § 62), e.g. *dąstvąm* beside Skt. *daṃsaḥ*, *mąθrəm* beside Skt. *mantram*.

> *m* before the hisses and semivowels represented a nasal lengthening of the preceding vowel.[1]

The same development is postulated for *-*ns*- in Irish,[2] and is further attested in Old Lithuanian by alternations of the type *kándu* (pres.): *ką́siu* (fut.).[3] Amongst the modern languages parallel alternations may be quoted from Polish[4] and Spanish.[5]

On the basis of analogies in other languages it is therefore tempting to assume that the value of ŋ was a nasalization and lengthening of the vowel (if not already long); this view was adopted by Whitney,[6] and has support in the fact that the *TP* speaks of *anusvāra* as having precisely this value,[7] whilst the *AP* makes no mention of it apart from *anunāsika*.[8] Whitney further supports his interpretation by the fact that the *anusvāra* symbol is written *over* the vowel-symbol (e.g अंश or अँश for aŋʃa). The lengthening of the vowel is implied in the statement of the *TP* that metrically a syllable which is nasalized is equivalent to a syllable containing a long vowel.[9]

But on the other hand some of our authorities quite certainly distinguished the terms *anunāsika* and *anusvāra*, as the following passage from the *VP* indicates:

> According to Aupaśivi *anunāsika* of a vowel occurs only before a following vowel (Uvaṭa, 'e.g. mahãã indrah'), whilst before a following consonant there is an insertion of *anusvāra* (Uvaṭa, 'e.g. gavayaaŋs tvaʂʈre').[10]

A similar view is taken even by the *VŚ*, which in most respects is closely related to the *TP*.[1] The attempts to describe the phonetic value of this 'insertion', however, are remarkably unhelpful. The *PŚ* describes it as 'sounding like the lute';[2] the *RP* classes it with the vowels and fricatives as lacking contact,[3] and elsewhere says that it has either vocalic or consonantal qualities;[4] and at least one ancient grammarian could not be certain whether it was a nasalization of the vowel or a separate nasal unit.[5]

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[1] *Proc. Phil. Soc.* 1882–4, p. xv. Cf. Sturtevant, op. cit., § 174.

[2] Cf. Petersen, *Keltische Gr.* i, §§ 53.10, 94.3.

[3] Leskien, *Litauisches Lesebuch*, § 25.2; note also present tense formations of the type *szqlu*. The nasalized vowels of Old Lith. (*ą*, &c.) are now pronounced as non-nasal long vowels.

[4] Cf. Broch, *Slavische Phonetik*, § 124; Sokolnicka-Izdebska, *Étude Expérimentale des Consonnes Nasales en Polonais*, pp. 38 ff.; also E. Koschmeider, *Z. f. vgl. Sprachforschung* 69. 3/4, 1951, pp. 219 ff.

[5] Cf. Navarro Tomás, *Pronunciación Española*, pp. 111 f.

[6] On *TP* ii. 30; cf. Grammont, op. cit., p. 365.

[7] Loc. cit. *anusvārottamā anunāsikāḥ*, with xv. 1. . . . *pūrva-svaro 'nunāsikaḥ*.

[8] Cf. Varma, op. cit., pp. 148 ff., Renou *s.v.*

[9] xxii. 14. Cf. modern developments such as Hindi bã:s<Skt. vaŋʃa; see also R. L. Turner, 'The Indo-Aryan Nasals in Gujrati' (*JRAS* 1915), p. 19.

[10] iii. 130–2. *anunāsikam upadhā . . . svara Aupaśiviḥ: anusvāreṇa vyañjane* (Uvaṭa: *ayam upadhā-nakārayor antarā bhavati*).

It is thus extremely difficult to determine the phonetic basis of our descriptions. Translations of the difficulty such as 'spirantical to vowel-like *n* (*m*)'[6] do not really help; metrical considerations alone provide no clue since syllables of the types **VNC**, **V̆̃V̆̃C**, **VV̆̃C** would in any case be metrically equipollent; and modern Sanskrit pronunciations are so various with regard to *anusvāra* as to be of little assistance.[7] It seems certain, however, that some of the ancient writers had perceived something other than a simple nasalization of the vowel; the linear nature of this feature is indicated in the *VP* quotation above, and we have also the statement of the *TP* that some authorities prescribe the insertion of a 'nasal increment' after the vowel.[8] In the present state of our knowledge it would perhaps be unwise to say more than that these authorities had observed some form of nasalized glide in the transition from the vowel to the fricative.[9] Their disagreements as to its vocalic or consonantal nature may perhaps have a dialectal basis; in this connexion the following slight indications may be noted on either side:

(i) In describing the mode of transition from **a** to **i/u** in the diphthongs **ai/au**, the *RP* compares it to the union of **a** with *anusvāra*:[1] this comparison, with its implication that **aŋ** in some way resembled a diphthong,[2] is on the face of it reminiscent of the Portuguese 'sonorization' of nasals (*cantão*<Lat. *cantan*(*t*), &c.).[3] Some support for such a realization is perhaps provided by Oriya **baũsə**<Skt. **vaŋʃa**, &c.[4]

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[1] *VŚ* 169 (Lüders, p. 85).

[2] 23 (*alābu-vīṇā-nirghoṣaḥ*).

[3] xiii. 11. *svarānusvāroṣmaṇām aspṛṣṭaṃ sthitam*.

[4] i. 5. *anusvāro vyañjanaṃ vā svaro vā*.

[5] Cf. *RP* xiii. 37. *Vyāḷir nāsikyam anunāsikaṃ vā*.

[6] Cf. Buiskool, op. cit., pp. 146 f.

[7] Cf. Grierson, *On the Modern Indo-Aryan Vernaculars*, p. 101; also *JRAS Cent. Supp.* 1924, p. 119 ('In schools, to prevent certain sounds being neglected, the teaching Paṇḍits have all sorts of expedients to enforce their existence upon the pupils'). An extreme example is provided by the realization of **ɱ** in Yajurvedic recitation as **[ghum]**, e.g. **[aghumʃunaa]** for **aɱʃunaa**.

[8] xv. 2–3. *naikeṣām: tatas tv anusvāraḥ* (*Tribh.—svarāt paro 'nusvāra āgamo bhavati*).

Cf. discussion Bergaigne-Whitney in *MSL* ii. 31 ff., 194 ff.

[9] Both Bloch (op. cit., p. 37; *Cinquantenaire de l'école pratique des hautes études* 1921, *Partie orientale*, p. 65) and Chatterji (op. cit., § 130) seem to suggest a lengthening of the vowel with nasalization of the second portion.

(ii) The treatises which insist on a consonantal interpretation of *anusvāra* (generally velar)[5] are of late composition,[6] and this pronunciation is expressly condemned by Uvaṭa in his commentary on the *RP*.[7] North-western developments, however, as exemplified by Sindhi *vañjhu*<*vaṃśa*, *hañju*<*haṃsa*, are suggestive of a transition **-NS->-N^{t}S-** (cf. the Sanskrit sandhi **mahaantsan** for **mahaan+san**, &c.).[8]

The extension of *anusvāra* in Classical Sanskrit to cases where the following consonant is a semivowel provides no fresh difficulty. But, as already mentioned, Pāṇini allows the optional use of **ŋ** in certain cases where earlier treatises prescribe a homorganic nasal. It has been suggested that this extension was purely graphic, and based on the convenience of the simple symbol ˙ to represent nasality;[9] this seems less than fair to Pāṇini's linguistic competence, though the possibility of a phonological rather than phonetic basis for the extension must not be overlooked.

Graphic considerations may well underlie the later extension of

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[1] xiii. 41 (*hrasvānusvāra-vyatiṣaṅgavat*).

[2] **ai/au** are in fact contrasted with **e/o**, where the qualities of **a** and **i/u** are 'fused' (xiii. 40. *saṃsargād*): cf. 2. 13 below.

[3] Cf. Bourciez, *Éléments de linguistique Romane*, § 333*e*; E. B. Williams, *From Latin to Portuguese*, § 157; A. R. Gonçalves Vianna, *Portugais: Phonétique et phonologie*, §§ 29–32.

[4] Of interest, though of doubtful historical significance, is the Marathi pronunciation of Skt. tatsamas, e.g. **əw̃ʃ^{ə}** (< *aṃśa-*), **maw̃s** (< *māṃsa-*), **əhiw̃sa** (< *ahiṃsā*), **siw̃h^{ə}** (< *siṃha-*). If this does in fact reflect an historical feature, the realization of *anusvāra* might be simply stated in terms of homorganic articulation for every case, including the fricatives—e.g. ***-am+s-** > ***-az̃ s-**; friction and voice being mutually incompatible, the heavy quantity of the syllable, if it contains a short vowel, is maintained by a **w**-type vowel-closure (cf. on *visarga*-sandhi, p. 68, n. 1); thus ***-az̃ s-** would > ***-a^{w} s-**, &c.

[5] Cf. Varma, op. cit., p. 15, and *VŚ* 170 (Lüders, p. 87). Note also the present-day Bengali pronunciation of Skt. **ŋ** as **ŋ**.

[6] Note, however, the *VP*'s reference to a velarity of unspecified type (i. 83. *jihvāmūlīyānusvārā hanu-mūlena*); cf. *Āp. Ś.* i. 10.

[7] xiii. 22.

[8] Cf. Bloch, op. cit., p. 88.

[9] S. K. Shastri, *RT* Notes, p. 54; cf. Bloch, op. cit., p. 40.

anusvāra to replace homorganic nasals within a morpheme.[1] Of such extensions Whitney has said:

> To . . . write the *anusvāra* sign in the interior of a word for a nasal mute which is equally radical or thematic with the succeeding non-nasal . . . seems an indefensible practice, and one wholly to be disapproved and rejected.[2]

These strictures are directed against Max Müller's support of the practice referred to,[3] but there is much to be said on the other side. For although this 'slovenly and undesirable habit'[4] may well have grown out of mere graphic convenience, it incidentally recognizes an important phonological principle, namely, that the **n** or **m** in a sequence **Vnt** or **Vmp** is a very different functional unit from that in **VnV** or **VmV**; for whereas in the latter case **n** and **m** are mutually contrastive, this is not so in the former case.[5] The homorganic nasals form a single phonological unit, and a phonological transcription will recognize this fact.[6] This is particularly the case in those modern Indo-Aryan languages where the only purpose of certain nasal symbols taken over from Sanskrit (velar, palatal,[7] retroflex) is to represent homorganic nasality before consonants of the appropriate series. In some dialects, moreover, we find alternative pronunciations of the type **VNT/Ṽ:T**,[8] i.e. an alternation of homorganic nasal (*para-savarṇa*) with nasality and length of vowel (*anunāsika*); in such cases the convenience and phonological appropriateness of a single symbol for the two possible realizations are obvious.[1] Possibly similar alternations were prevalent in more ancient times, and gave rise to at least some of the confusion which besets the early phoneticians.

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[1] Lithuanian here provides another parallel, in that the indigenous grammars extend the nasal vowel-symbol (which is phonetically justified before the fricatives) as a graphic device for writing the homorganic nasal before stops (e.g. *pįti* for *pinti*): cf. Leskien, op. cit., § 26.

Note also that the *Sarvasaṃmata-Śikṣā*, in prescribing this extension (32), acknowledges that *anusvāra* here 'lacks its peculiar properties' ('. . . *ity atrānusvāro 'pi vidharmakaḥ*').

[2] *JAOS* ix. 69 n.

[3] *Hitopadeśa*, Introd., pp. x–xi.

[4] Whitney, *Skt. Gr.*, § 73*b*.

[5] Cf. J. R. Firth, *Proc. 2nd Int. Cong. Phon. Sc.*, p. 180.

[6] Note also the use of a special symbol (𐬧) for the homorganic nasal in Avestan, where there can hardly be any question of graphic convenience (**n** = 𐬥, **ŋ** = 𐬣, **m** = 𐬨): cf. Bartholomae, *Gr.*, § 268. 53.

[7] Even in Sanskrit the palatal **ɲ** cannot be justified on a distinctive basis (cf. Emeneau, *Lang.* xxii. 89 ff.).

[8] Cf. Prasad, op. cit., pp. 467 ff. (e.g. **lʌmba:/lã:ba:**). Similar alternations are historically suggested by doublets in Marathi (cf. Bloch, *La Formation de la langue marathe*, p. 82).

The problem of *anusvāra* has been considered at some length; for whilst it is in itself disappointingly unrewarding, it serves to demonstrate how little we might know if our sources had been equally imprecise on other points. In view of their generally high standard of competence it seems fair to assume that the phonetic problem in question was a particularly difficult one, complicated perhaps by multiple contextual, dialectal, and personal fluctuations. If we were to seek an attested feature of a modern language such as might give rise to uncertainties of a similar order, if not of type, it might perhaps be found in the Japanese so-called 'syllabic nasal' (ŋ),[2] which has so strangely received special recognition amongst the otherwise general phonetic categories of the International Phonetic Alphabet.

1.13. *The Vargas*

With regard to the three extra-buccal articulatory processes discussed above (glottal, pulmonic, nasal) it should finally be remarked that their combination with the intra-buccal process of maximal closure gives rise to a set of five *sparśa* letters for each of the five places of articulation—e.g. for the velars **k, kh, g, gh, ŋ**. Each such set is known as a *varga*, 'class', the members of which are sometimes referred to by number as follows:

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[1] Cf. Bloch, loc. cit. 'La regularité de cette alternance fait que le seul signe de l'*anusvāra* suffit à noter ces deux cas: dans le cas où la voyelle est brève, il représente la nasale de même ordre que la consonne qui suit; si la voyelle est longue, l'*anusvāra* a la même valeur que l'*anunāsika*.'

[2] Before condemning the Indians for their disagreements and obscurities in the description of *anusvāra*, it may be salutary to compare the diversity of modern descriptions of the Japanese feature in question; the following may be referred to:

H. Frei, *Bull. de la Maison Franco-Japonaise*, VIII. i. 137.
H. E. Palmer, *The Principles of Romanization*, p. 111.
D. Jones, *The Phoneme*, p. 88, n. 3.
E. R. Edwards, *Étude phonétique de la langue japonaise*, p. 31.
M. G. Mori, *The Pronunciation of Japanese*, § 13.18.
P. M. Suski, *The Phonetics of Japanese Language*, pp. 71 ff.
B. Bloch, 'Studies in Colloquial Japanese IV (Phonemics)', *Language*, xxvi, 1950, p. 102.
S. E. Martin, *Morphophonemics of Standard Colloquial Japanese* (*Language Dissertation No. 47*), pp. 12 f.

Whilst not implying adverse criticism of all these statements, we may wonder whether linguists in a distant future, reading such various accounts—ranging from 'semi-consonne ou semi-voyelle' to 'voiced frictionless mediovelar spirant'—will have any clearer an idea regarding the phonetic value of the Japanese 'syllabic nasal' than we have regarding that of the Sanskrit *anūsvāra*.

Voiceless non-aspirate—'1st.' (*prathama*)
,, aspirate —'2nd.' (*dvitīya*)
Voiced non-aspirate —'3rd.' (*tṛtīya*)
,, aspirate —'4th.' (*caturtha*)
Nasal —'5th.' (*pañcama*) or 'last' (*uttama*).

In the table on p. 20 the block of 5 by 5 *vargīya* letters is enclosed within the heavy line.

डा० विद्या निवास मिश्र
प्राध्यापक, भाषा विज्ञान
निजी पुस्तकालय
पुस्तक संख्या……

PART II

LETTERS

2.0. *Consonants*

It is the Indian practice to describe the places of articulation in the reverse order to that of the IPA. Quite logically they begin with those which are nearest to the origin of the air-stream and work progressively upwards and forwards towards the lips.

2.00. *Pulmonic and Glottal*

Thus the first organs to be considered are the lungs, which are treated as the place of articulation for the voiced **h** **[ɦ]** and voiceless **-ḥ**. This treatment, however, is optional; most of the treatises also allow these sounds to be classed as 'glottal fricatives'—a term which is still commonly accepted today, though in need of revision (the Greek term 'breathing' (*πνεῦμα*) might be more appropriate).[1] The following statements illustrate the alternative prescriptions:

> The fricatives **h** and **-ḥ** are glottal (*kaṇṭhya*); or, as some say, pulmonic (*urasya*).[2]
>
> **h** and **-ḥ** are glottal; the latter may alternatively be considered as pulmonic.[3]

Certain of our authors allow the pulmonic alternative only in the case of **h** followed by nasals or semivowels:

> **h** before nasals and semivowels is to be considered as pulmonic; otherwise it is glottal.[4]

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[1] Particularly in view of its frequent prosodic function (the Greek *πνεῦμα* is a *προσῳδία*); cf. J. R. Firth, *TPS*, 1948, p. 131.

[2] *RP* i. 39–40. *prathama-pañcamau ca dvā ūṣmaṇām* (sc. *kaṇṭhyau*): *kecid etā urasyau.*

[3] *RT* 2–3. *hāḥ kaṇṭhe: urasi visarjanīyo vā.*

[4] *PŚ* 16.

hakāraṃ pañcamair yuktam antaḥsthābhiś ca saṃyutam
aurasyaṃ taṃ vijānīyāt kaṇṭhyam āhur asaṃyutam.

Cf. *Sarvasaṃmata-Ś.* 42.

hakāram aurasaṃ vidyād antasthāsu parāsu ca
uttameṣu pareṣv evam . . .

The basis of this distinction is problematic; but it is to be noted that for one form of junction initial groups of the type **h**+nasal or semivowel are optionally treated as if the **h** were phonematically irrelevant (**kin hnute, kiỹ hyah**, &c.—see further 3.122 below), i.e. **h** is considered as a prosodic, non-linear feature of

We have already suggested that Sanskrit **h** [ɦ] might be considered as an 'overblowing' of the following vowel; the close relationship of both **h** and **-h** to their vocalic context is mentioned by the *TP*:

> For **h** and **-h** the glottis is the place of articulation; but in the opinion of some authorities **h** is homorganic with the beginning of the following vowel, and **-h** is homorganic with the end of the preceding vowel.[1]

Whitney's observations are for once entirely sympathetic; with reference to the pulmonic nature of these sounds he says,[2]

> The authority who called the aspirations chest-sounds may also be commended for his acuteness, since in their production it may even be said that the throat has no part: it is only, like the mouth, the avenue by which the breath expelled from the chest finds exit;[3]

elsewhere he shows himself to be in agreement with the view that they are homorganic with their vocalic context:

> Why, then, shall we pronounce the larynx the 'characteristic place of production' of *h*, any more than of the vowels? . . . An *h* is a sound which is produced in any one of these same positions of the mouth-organs (sc. as for the vowels), but with the vocal cords in the larynx only slightly approached.[4]

The *RP* rather surprisingly lists this homorganic realization amongst the 'faults' in chap. xiv;[5] but Uvaṭa quotes another commentator who considers this statement to be out of place, and who prefers to treat it as a rule rather than a prohibition—'for not even the gods could pronounce it in any other manner'![6]

This will be a convenient point to give some account of various

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breathiness (cf. *BSOAS* xiii. 944 f.), the realization of which may occur simultaneously with that of the phonematic units. It is perhaps this peculiarity that our treatises intend to indicate.

[1] ii. 46–8. *kaṇṭha-sthānau hakāra-visarjanīyau: udaya-svarādi-sasthāno hakāra ekeṣām: pūrvānta-sasthāno visarjanīyaḥ.* As the *Tribhāṣyaratna* expresses it, they have no articulator of their own (*anayoḥ karaṇābhāvaḥ*). Cf. Sweet, *NEG* I, § 237; D. Jones, *Outline of English Phonetics*^{5}, §§ 777 ff.; Broch, *Slavische Phonetik*, §§ 2, 51.

[2] On *AP* i. 19.

[3] I cannot agree with Fry (*Lang.* xvii. 199) when he states: 'The use of the adjective *aurasa* . . . does not appear to be more than a hazy attempt to localize the open spirants representing *ḥ* in pausa.'

[4] *JAOS* viii. 350. Cf. D. Jones, op. cit., p. 23, n. 1; H. Abrahams, *Études Phonétiques sur les Tendances Évolutives des Occlusives Germaniques*, p. 102.

[5] xiv. 30.

[6] *anya-sthāne . . . devair api na śakya uccārayitum.*

problems connected with **-h**. This voiceless breathing primarily occurs only in final position *in pausa*, where historically it replaces **s* (or less frequently **r*).[1] Corresponding to **-h** *in pausa*, there appeared in junction with initial voiceless consonants the appropriate homorganic fricatives (viz. **-x**, **-ʃ**, **-ʂ**, **-s**, **-ɸ**).[2] Three of these fricatives, **ʃ**, **ʂ**, **s**, occur also in initial and medial positions, where they are in parallel distribution and qualify as separate phonematic units, which consequently find their place amongst the other 'letters of the alphabet'. **-x** and **-ɸ**, however, as also **-h**, are '(*a*)*yogavāha*' (cf. 0.42 above), i.e. they are bound to final position, and are in complementary distribution (**-x** before velars, **-ɸ** before labials, and **-h** *in pausa*). This alternation is understandable enough, and it is impossible to agree with Whitney's evaluation of **-x** and **-ɸ**:

> It may be fairly questioned, perhaps, whether these two sounds are not pure grammatical abstractions.[3]

Since these variants are not included in the alphabet, special names are devised for them, viz. *visarjanīya* (or later *visarga*) for **-h**, *jihvāmūlīya* for **-x**, and *upadhmānīya* for **-ɸ**. The last two terms provide no difficulty: *jihvāmūlīya*, lit. 'formed at the root of the tongue', is the general term for 'velar', and *upadhmānīya* means literally 'blowing upon'—the consecrated description of the voiceless bilabial fricative.[4] The term for **-h** is not so readily explicable —a fact which is reflected in Monier-Williams's dictionary:

> It is called Visarjanīya either from its liability to be 'rejected' or from its being pronounced with a full 'emission' of breath, or from its usually appearing at the 'end' of a word or sentence.

The verb from which the word is derived (*vi-sṛj-*) has meanings of the type translatable by 'to discharge, relax, cast off', &c. We shall perhaps be giving the most direct and phonetically appropriate translation if we render it by 'off-glide', as referring to the breathy transition from the vowel to silence.

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[1] Cf. e.g. **gharmah** beside Gk. *θερμός*, **antah** beside Lat. *inter*.

[2] *AP* ii. 40. *visarjanīyasya para-sasthāno 'ghoṣe*.
RP iv. 31–2. *aghoṣe . . . coṣmāṇaṃ sparśa uttare tatsthānam . . . tam evoṣmāṇam ūṣmaṇi*.
RT 177. *ūṣmā sthānam* (Comm. *ūṣmā ca para-sasthānam āpadyate*).
TP ix. 2. *aghoṣa-paras tasya sasthānam ūṣmāṇam*.
VP iii. 6–12.

[3] *Skt. Gr.*, § 69. Cf. on *AP* ii. 40, 'The division of this indistinct and indefinite sound into three kinds of indefiniteness savors strongly of over refinement of analysis.'
For other sceptics see note by Fry, op. cit., p. 194.

[4] e.g. D. Jones, op. cit., § 685, 'One form of ɸ is the sound made in blowing out a candle.' Cf. Sapir, *Language*, i. 37 ff.

In later, though still ancient, times there appears to have been a tendency for **-h** to extend its usage to contexts other than *in pausa*. The earliest of these extensions was to the position before the initial fricatives **ʃ-, ʂ-, s-**, where it replaced the homorganic final **-ʃ, -ʂ, -s** (**indraʃ ʃuurah>indrah ʃuurah**, &c.).[1] This practice was then extended to the position before the velar and labial voiceless stops: in connexion with this innovation we find mentioned the names of Āgniveśya, Vālmīki, Śākalya, and the Mādhyandina school, whilst the ancient grammarian Śākaṭāyana[2] is quoted as holding to the more conservative practice.[3]

These changes have been generally accepted so far as the writing of Sanskrit is concerned, and A. H. Fry in his article 'A Phonemic Interpretation of Visarga'[4] has suggested that the spread of **-h** was due to the writers of Classical Sanskrit 'operating with a phonemic orthography'. Though the term 'orthography' once again begs the vexed question of writing, it is possible that this extension had a phonological rather than a phonetic basis; but in this matter we are faced with similar uncertainties to those which enshroud the extension of *anusvāra* at the expense of the homorganic nasals.

2.01. *Velar*

The velar series (*ka-varga*) is most generally described as being produced at the *jihvā-mūla*, 'root of the tongue', which is, strictly speaking, an articulator and not a place of articulation: the *sthāna* of this series is in fact the *hanu-mūla*[5] or 'root of the (upper) jaw'—a rather inadequate though intelligible designation of the soft palate—

> In the *k*-series contact is made by the root of the tongue at the root of the jaw.[6]

Amongst the velar consonants is also mentioned the velar fricative **x** (*jihvāmūlīya*),[7] to which reference has already been made.

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[1] Cf. *TP* ix. 5; *VP* iii. 10; *Pāṇ.* VIII. iii. 36.

[2] Not to be confused with the ninth-century author of the *Śākaṭāyana-Vyākaraṇa.*

[3] Cf. *TP* ix. 4; *VP* iii. 11–12.

[4] *Language*, xvii. 194 ff.

[5] Cf. *AP* i. 20. *jihvāmūlīyānāṃ hanu-mūlam.*

[6] *TP* ii. 35. *hanu-mūle jihvā-mūlena ka-varge sparśayati.* Cf. *VP* i. 83.

[7] e.g. *VP* i. 65; *RP* i. 41; *RT* 4. For the general term 'velar' the *Āp. Ś.* uses *jihvya*, 'lingual' instead of the usual *jihvāmūlīya*.

विद्या निवास मि
अध्यापक, भाषा विज्ञान
निजी पुस्तकालय
पुस्तक संख्या…………

The Indian term 'root of the tongue' has found favour with a number of Western phoneticians, amongst them Sweet[1] and Pike.[2]

It has to be mentioned that in the later Pāṇinean scheme, as reflected, for example, in the *Siddhānta-Kaumudī*, the pulmonic breathings (alias 'glottal fricatives') are classed with the k-series,[3] the whole group being referred to as 'glottal' (*kaṇṭhya*).[4] The unequivocal name of the fricative *jihvāmūlīya* preserves it from this confusion.[5]

2.02. *Palatal*

No difficulty is provided by the descriptions of the c-series, which at the period described by our treatises appear still to have been true palatal plosives rather than prepalatal affricates such as are general in modern Indian pronunciations.[6] They are described as being articulated 'at the palate (*tālu*)':[7] more specifically,

> In the c-series contact is made with the middle of the tongue upon the palate.[8]

2.03. *Retroflex*

We have seen that the retroflex series involves a special process rather than a place of articulation. Since, however, the Indian scheme treats this series as parallel to the other *vargas*, and next in order after the palatals, it will be appropriate to consider it at this point. Though the term for 'retroflexed' (*prativeṣṭita*) is well attested in the descriptions given by our treatises, the general term for the retroflex series, employed by both grammarians and phoneticians, is *mūrdhanya*, an adjective derived from *mūrdhan*, 'head'—e.g.

> For the *mūrdhanyas* the articulator is the tip of the tongue retroflexed;[9]
>
> In the ṭ-series contact is made with the tip of the tongue rolled back in the *mūrdhan*.[10]

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[1] *Primer*, § 71.

[2] *Phonetics*, pp. 120 f.

[3] *SK* 10. *a-ku-ha-visarjanīyānāṃ kaṇṭhaḥ*. Cf. *Āp. Ś.* i. 7.

[4] In this imprecise usage *kaṇṭhya* is perhaps best rendered by the equally imprecise 'guttural'.

[5] *SK* 10. *jihvāmūlīyasya jihvā-mūlam*.

[6] See also Grierson, *JRAS*, 1913, pp. 391 ff.

[7] e.g. *VP* i. 66; *RT* 5.

[8] *TP* ii. 36. *tālau jihvā-madhyena ca-varge*. Cf. *AP* i. 21; *VP* i. 79.

[9] *AP* i. 22. *mūrdhanyānāṃ jihvāgraṃ prativeṣṭitam*. Cf. *VP* i. 78.

[10] *TP* ii. 37. *jihvāgreṇa prativeṣṭya mūrdhani ṭa-varge*.

Commenting on the latter statement, the *Tribhāṣyaratna* says,

> By the word *mūrdhan* is meant the upper part of the buccal cavity;[1]

But there is no evidence that the word was ever used in this special sense, and comparisons by modern commentators with Greek *οὐρανός*[2] (lit. '(vault of) heaven', thence applied to 'roof of the mouth') are hardly relevant. *Mūrdhan* means simply 'head' or 'summit',[3] and the Indian terminology is reflected in the still not entirely obsolete terms 'cerebral' and 'cacuminal'.[4] The term is in fact unusually imprecise, and Whitney is probably right in suggesting that it represents a traditional title surviving from a period when phonetic science was less well developed[5] (cf. also the term *ūṣman* for the fricatives—1.111 above). From the historical standpoint the retroflex sounds are relative late-comers into Indo-Aryan and they consequently occupy a peculiar place in the phonological system;[6] they are thus likely to have attracted attention even at a period when specialist phonetic analysis was unknown, and the terminology, like that of Latin in the west, is likely to have persisted into a period of more precise description.

In connexion with the role of the tongue in the retroflex series, the *Āp. Ś.* makes the remarkably acute observation that the contact is made not with the tip but 'with the part next to the tip, or the under-side of the tip'.[7]

Functioning phonologically as a member of the retroflex series we have also the semivowel **r**; on the phonetic value of this letter, however, widely diverse accounts are given,[8] ultimately depending perhaps on dialectal variation. The same applies to the vowel **ṛ**, which will therefore be most conveniently considered in connexion with the semivowel.

The retroflex pronunciation of both semivowel and vowel is in fact prescribed by the *PŚ*,[1] but is exceptional elsewhere.[2] The Prātiśākhyas generally require an alveolar articulation[3] (which agrees with the present pronunciation of Sanskrit and the general practice of the modern Indo-Aryan languages).

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[1] *mūrdha-śabdena vaktra-vivaropari-bhāgo vivakṣyate.*

[2] Cf. Max Müller on *RP* 44.

[3] The *PŚ* (13), in a list of the *sthānas*, also uses the term *śiras* in place of *mūrdhan*.

[4] Cf. Pike, op. cit., p. 123.

[5] On *AP* i. 22, *TP* ii. 37.

[6] Cf. also Jakobson, *Proc. 3rd Int. Cong. Phon. Sc.*, p. 40.

[7] ii. 6–7. *jihvopāgreṇa mūrdhanyānām: jihvāgrādhaḥkaraṇaṃ vā.* Cf. J. R. Firth in Harley, op. cit., p. xix: 'The Indian ṭ is not made with the tip in the English manner, but with the very edge or rim of the tip, which is slightly curled back to make this possible'. See also *BSOAS* xii, 859.

[8] Cf. Varma, op. cit., pp. 6 ff.

The *AP*, *VP*, and *RT* refer to the alveolar position by the term *danta-mūla*, 'root(s) of the teeth',[4] a name which has been employed also by Sweet.[5] A slight difficulty is caused by the fact that some of the treatises refer to the dental series by this same term; in such cases, however, the reference is to the junction of the teeth with the gums (Sweet's 'rim'),[6] and the alveolar position of **r** is then clearly distinguished by a further description, e.g.

> For **r** contact is made by the centre of the tongue-tip behind (*pratyak*) the roots of the teeth,[7]

the word *pratyak* being further interpreted by the *Tribhāṣyaratna* as meaning 'within and above'.[8] Certain authorities quoted by the *RP* also refer to **r** as '*vartsya*',[9] a hapax glossed by Uvaṭa as denoting 'the projection behind the roots of the teeth',[10] i.e. the alveolar arch.[11]

The prescription of alveolar articulation corresponds well with the name *repha* interpreted as 'tearing sound' (see 0.42 above), in that a rolled **r** such as this seems to imply could hardly be retroflex;[12] excessive rolling, however, is listed as a fault by the *RP*,[13] and Uvaṭa refers to this type of pronunciation as 'indelicate'.[14] Two treatises, the *RP* and the *RT*, treat **r** as dental, but mention the alveolar pronunciation as an alternative.[15]

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[1] 17. *syur mūrdhanyā r̥-ṭu-ra-ṣāḥ.*

[2] *Āp. Ś.* i. 13. *r̥-ṭu-ra-ṣā mūrdhanyāḥ*, but 14 *ro danta-mūla-sthānam ekeṣām.*

[3] Cf. *AP* i. 28; *TP* ii. 41; *VP* i. 68.

[4] *AP* i. 28. *rephasya danta-mūlāni; VP* i. 68. *ro danta-mūle; RT* 8.

[5] *Primer*, p. 8.

[6] Ibid. (Sweet's terminology distinguishes this 'rim' from the 'edges').

[7] *TP* ii. 41. *rephe jihvāgra-madhyena pratyag danta-mūlebhyaḥ.*

[8] *pratyag ity abhyantara upari-bhāga ity arthaḥ.*

[9] i. 46. *rephaṃ vartsyam eke.*

[10] *vartsa-śabdena danta-mūlād upariṣṭād ucchūnaḥ pradeśa ucyate.*

[11] If a special term is required to translate *vartsya*, 'gingival' might be appropriate—cf. Pike, op. cit., p. 122: '. . . alveolar arch (which might with more justice be called the gingival one, since the contact is made against the gum, not the bone . . .)'; Bloomfield, *Language*, p. 98.

[12] The fricative nature of the retroflex **r** is clearly indicated by its equivalence to [ʐ] in the sandhi ***sarvaiʂ+guɳaih = sarvair guɳaih**, &c.

[13] xiv. 26. *atisparśo barbaratā ca rephe.*

[14] *barbaratāpy asaukumāryam eva.*

[15] *RP* i. 44–46; *RT* 7–8 (*dante tslāḥ: repho mūle vā*).

The disagreements on the pronunciation of **r** are duly noted by Uvaṭa:

> Some schools pronounce **r** as a 'cerebral', some as an alveolar.[1]

As regards the vowel **ṛ**, an alveolar pronunciation is suggested by the *TP* in a passage which reads:

> In **ṛ** and **rṛ** . . . the tip of the tongue is approximated to the '*barsvas*'.[2]

The *Tribhāṣyaratna* interprets the '*barsvas*' as referring to 'the elevations behind the row of teeth',[3] which is reminiscent of its comment on the semivowel **r** (see above). Other treatises, however, agree in allotting **ṛ** to the velar class:[4] this prescription is problematic, and is applied by at least one author also to **ḷ**.[5] The latter appears only in the single root **kḷp-**, and it has been suggested that in such a phonetic context **ḷ** is likely to have been articulated with 'dark' resonance, and that it is this which has caused it to be classed as velar[6] (cf. on consonantal **l**, 2.04 below). But no such arguments apply to **ṛ**, and indeed the Middle Indian developments point rather to a palatal resonance for both vowels.[7] It is in any case difficult to believe that the Indians would have classified these sounds by their secondary rather than their primary articulations. It is just possible that in connexion with **ṛ** we should interpret *jihvāmūlīya* as 'uvular' rather than 'velar'; it is only strange that we have no such description of the semivowel **r**, except in so far as it is mentioned amongst a list of alternatives by the *Varṇapaṭalam*.[8]

In the retroflex series there remains only a peculiarity connected with the fricative **ṣ**. In the *Pratijñā Sūtra* we find the statement,

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[1] On *RP* i. 1. *kasyāṃ śākhāyāṃ repho mūrdhanyaḥ kasyāṃ dantamūlīya iti.*

[2] ii. 18. *jihvāgram ṛkārarkāralkāreṣu barsveṣūpasaṃharati.*

[3] *barsveṣv iti danta-paṅkter upariṣṭād ucca-pradeśeṣv ity arthaḥ.*

[4] Cf. *VP* i. 65. *ṛḫkau jihvā-mūle; RT* 4. *jihvā-mūle ḫ kṛ; RP* i. 41.

[5] *RP* i. 41. *ṛkāralkārāv atha ṣaṣṭha ūṣmā jihvāmūlīyāḥ prathamaś ca vargaḥ.*

[6] Whitney on *AP* i. 20.

[7] e.g. *kilitta* < *kḷpta*, *kisa* < *kṛśa*, *isi*/*risi* < *ṛṣi*. The Prakrit grammarians prescribe a development to *a*, but this is largely a Mahārāṣṭrī peculiarity (e.g. *ghaa* < *ghṛta*: cf. Hemacandra i. 126, and Pischel, §§ 47 ff.). The development to *u* (as e.g. M. *ṇihua* < *nibhṛta*) is generally associated with a labial context. There is, however, considerable fluctuation, and Bloch, *L'Indo-Aryen*, p. 36, goes so far as to remark, 'La coloration de la voyelle est imprévisible.' For *ṝ* (**rṛ**) we have in AMg. *ī* or *ū* (Pischel, § 58).

[8] ii. 5.

apara āha
hanu-mūle tu rephaḥ syād danta-mūleṣu vā punaḥ
pratyag vā danta-mūlebhyo mūrdhanya iti cāpare.

> Alone or combined with consonants (other than retroflex), **ṣ** is to be pronounced as **kh**,[1]

a statement which is repeated in a number of the later Śikṣās.[2] This pronunciation of **ṣ** is common in Sanskrit loan-words in some of the modern languages (e.g. Hindi **dokh** beside Skt. **doṣa**), and is traditional in Yajurvedic recitation.[3] There is, however, no mention of such a pronunciation in the earlier treatises.[4]

2.04. *Dental*

The dentals are unequivocally described as being produced 'at the teeth'[5] or 'at the rim of the teeth'.[6] The *VP* and *AP* go on to specify the tip of the tongue as articulator,[7] the latter work further stating that the tip is '*prastīrṇa*',[8] a word which is most naturally translated by 'spread, flat' (not, as Whitney, 'thrust forward')—a characteristic feature of dental articulation.[9] The *RP*, however, disapproves of excessive tongue-spreading in any of the stop series.[10]

l is generally treated as the semivowel associated with the dental class, and most of the treatises prescribe a dental realization. The *RP* includes in its list of faults an articulation 'with both ends of the tongue';[11] on this rather strange statement Uvaṭa is not illuminating; and although the word *anta* may also mean 'side',[12] Max Müller's 'mit den Seiten der Zunge' is phonetically unacceptable unless the reference is to opening and not contact[13] (i.e. bilateral as against unilateral articulation). The *RP*'s disapproval is perhaps directed against the secondary back-raising mentioned above, which would produce velar resonance or 'dark l' [ɫ], the typical Indian **l** being of clear quality.

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[1] 18. *atho mūrdhanyoṣmaṇo 'saṃyuktasya ṭum ṛte saṃyuktasya ca khakāroccāraṇam.*

[2] Cf. Varma, op. cit., pp. 34 f.

[3] Cf. Grierson, *Modern Indo-Aryan Vernaculars*, p. 58.

[4] There is some evidence in the work of Alberuni (11th cent. A.D.) for a pronunciation as a velar fricative [x]; cf. Sachau, 'Indo-Arabische Studien' (*Phil. u. Hist. Abh. d. Kön. Akad. d. Wiss. z. Berlin*, 1888), pp. 12 f., and *Alberuni's India*, trsl. Sachau, i. 359 (cf. ii. 188); see further S. K. Chatterji, *Al-biruni Commem. Vol.*, p. 91; *Indian Linguistics*, vii. 3, p. 164.

[5] e.g. *VP* i. 69; *RT* 7.

[6] *RP* i. 44; *TP* ii. 38.

[7] *VP* i. 76. *dantyā jihvāgra-karaṇāḥ*; *AP* i. 24.

[8] *dantyānāṃ jihvāgraṃ prastīrṇam.*

[9] Cf. J. R. Firth in Grahame-Bailey, *Teach Yourself Hindustani*, p. xviii, '. . . d is produced with a flat tongue spread out . . . .'

[10] xiv. 21. *vargeṣu jihvā-prathanaṃ caturṣu* (Uvaṭa: *jihvāyāḥ prathanaṃ nāma vistāraḥ*).

[11] xiv. 27. *jihvāntābhyāṃ ca vacanaṃ lakāre.*

[12] Cf. *TP* ii. 40.

[13] Cf. the description of [ʋ] as *sṛkva-sthāna* (2.05 below).

The vowel **ḷ** is also generally said to be dental; a statement prescribing velar articulation has already been referred to, and an alveolar articulation is required by the *TP*.[1]

2.05. *Labial*

The labial stops and the *upadhmānīya* fricative are described as being produced with the two lips,[2] or simply as 'at the lip',[3] i.e. at the upper lip as *sthāna*. For the semivowel **v**, which is regularly associated with the labial series, and which has a close phonological relationship with the lip-rounded vowel **u**, further observations are necessary. For whilst its earlier pronunciation was doubtless as a bilabial [w], it had by the time of our treatises acquired, at least in some dialects, the labio-dental articulation [ʋ] which is typical of many modern Indo-Aryan languages—'The learned', says the *PŚ*, 'declare **v** to be labio-dental.'[4] For [ʋ] only the middle of the lower lip is in contact with the teeth, and the observation quoted by the *Āp. Ś.*, that it is formed 'at the corners of the mouth',[5] is hence not inappropriate.[6]

2.1. *Vowels*

2.10. a.

In the discussions of the vowel-system considerable interest attaches to the first letter of the *varṇa-samāmnāya*, **a**. Mention has already been made of the tendency to group the long and short vowels into pairs designated by a single term, **i** and **ii**, for example, being referred to as *i-varṇa*, 'i-colour or quality'. In the case of **i/ii** and **u/uu** it would appear from the phoneticians' accounts that there was no great divergence of quality as between the short and the long vowels.[7] Phonologically parallel to the pairs **i/ii** and **u/uu** is the pair **a/aa**; but it is evident from the ancient descriptions that the members of this pair differed considerably not only in length (*kāla-bhinna*) but also in their quality or 'degree of openness' (*vivāra-bhinna*)—in the modern languages in fact the distinction is more generally maintained by the qualitative than by the quantitative difference.[1] **aa** is generally recognized by our texts as the most open (*vivṛta*) vowel, whilst **a** is referred to as relatively closer (*saṃvṛta*).[2] But the advantages of treating **a** and **aa** as members of a qualitative pair are, as Pāṇini realized, considerable; on this treatment depends, for example, the rule that,

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[1] ii. 18.

[2] *TP* ii. 39. *oṣṭhābhyāṃ pa-varge.*

[3] *VP* i. 70. *u-voḫ-pā oṣṭhe; RT* 9.

[4] 18. . . . *dantyoṣṭhyo vaḥ smṛto budhaiḥ.* Cf. *TP* ii. 43; *VP* i. 81.

[5] i. 16–17. *vakāro dantoṣṭhyaḥ: sṛkva-sthānam eke.*

[6] Cf. D. Jones, *Outline*, § 693: 'Indians generally replace **v** by a frictionless continuant ʋ in which the lower lip touches the centre front teeth lightly and is so held as to allow the air to escape chiefly at the sides' (with Fig. 90).

[7] But cf. Bloch, *L'Indo-Aryen*, p. 33.

> When a short vowel is followed by a similar vowel, the corresponding long vowel is substituted for them,[3]

so that parallel to junctions of the type **yadi+icchet = yadiicchet** and **saadhu+uktam = saadhuuktam** the rule is capable of embracing, e.g. **na+asti = naasti**, &c. Then, having based his phonological statements on the fiction of identical quality, Pāṇini cancels out the error by the phonetic admission of his famous last aphorism, '*a a*', i.e.

> The short **a**, which has for phonological purposes been treated as of identical quality with the long **aa**, is phonetically closer.[4]

This simple though ingenious device of Pāṇini's has given rise to a spate of involved and for the most part unedifying controversy; a lengthy discussion is found at the beginning of the *Mbh.*, but perhaps all that really need be said has been said in the *vārttika* with which the discussion opens—

> The treatment of **a** as open has as its purpose the inclusion of **aa** (sc. as the long member of the '*a-varṇa*').[5]

Even from the phonetic point of view, however, **a** and **aa** are sufficiently similar to be considered under a single articulatory heading, viz. as *kaṇṭhya*, 'glottal'—a term which has already been used in connexion with the voiced and voiceless 'breathings'—

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[1] See J. R. Firth, *Proc. 2nd Int. Cong. Phon. Sc.*, p. 179; cf. Bloch, op. cit., p. 31.

[2] e.g. *AP* i. 32–36; *VP* i. 72. *savarṇavac ca* (Uvaṭa: *akārasya mātrikasya dvimātrikasya . . . kaṇṭha-sthānatā uktā . . . āsya-prayatnas tu bhidyate . . . saṃvṛtāsya-prayatna akāraḥ vivṛtāsya-prayatnā itare svarāḥ*).

[3] VI. i. 101. *akaḥ savarṇe dīrghaḥ*.

[4] Some of the brevity of the original might be preserved by a rendering such as '**a** = [ə]'.

[5] I. i. 2, on *Pāṇ.*, *Śiv. Sū.* 1 (Kielhorn, i. 15). *akārasya vivṛtopadeśa ākāragrahaṇārthaḥ*.

> **a** is glottal[1]
>
> **a** and **h** are glottal[2]
>
> **a**, **h**, and **-h** are formed at the glottis.[3]

To class the open vowels as 'glottal' appears at first sight an indefensible procedure. It becomes less so when we perceive the conceptual framework underlying these statements. It will be remembered that the *TP* referred to a 'neutral' position of the articulatory organs, in which

> the tongue is extended and depressed, and the lips are in the position for **a**.[4]

The classification of **a** as glottal begins to make sense if we assume that it was viewed as a 'neutral' vowel in the sense of involving no special intra-buccal articulatory effort.[5] Such an assumption is fully supported by a statement in the *Mahābhāṣya*:

> The place of articulation of the **a**-vowels is extra-buccal: or, as some would have it, it is the whole mouth.[6]

In other words **a** has no specific intra-buccal *sthāna* or *karaṇa*; as with **h** and **-h**, it is a case of *karaṇābhāva* (cf. p. 49, n. 1).

From this recognition we may proceed to the peculiar doctrine mentioned by the *RP*, in itself inexplicable,[7] that all the vowels are to be pronounced with the 'articulatory condition' (*karaṇāvasthā*) of **a**.[8] This statement also becomes phonetically meaningful if **a** is interpreted as 'vocalic neutrality' or 'unmodified voice', on which are superimposed the vowel-articulations involving various degrees of tongue-raising.[9]

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[1] *RP* i. 38. *kaṇṭhyo 'kāraḥ.*

[2] *PŚ* 17. *kaṇṭhyāv a-hau.*

[3] *VP* i. 71. *a-ha-visarjanīyāḥ kaṇṭhe.* Cf. comm. on *AP* i. 19.

[4] See 1. 113.

[5] Cf. Sievers, *Gr. d. Lautphysiologie*, p. 38: 'Beim *a* ist der Mundcanal durchgehends mäßig geöffnet; die Zunge entfernt sich nicht viel aus ihrer Indifferenzlage.'

[6] 1. i. 4, on *Pāṇ*. 1. i. 9 (Kielhorn, i. 61) *bāhyaṃ hy āsyāt sthānam avarṇasya: sarva-mukha-sthānam avarṇam eka icchanti.* Cf. *Āp. Ś.* i. 11.

[7] Cf. Max Müller (on 823), '. . . sehr nichtssagend zu sein scheinen.'

[8] xiv. 65. *akārasya karaṇāvasthayānyān svarān brūyāt.* Cf. 66.

[9] The statement is of course nonsensical if *karaṇāvasthā* is simply interpreted as referring to the tongue-position; but the use of the term *avasthā* (not *sthāna*), a word otherwise unattested in the phonetic literature, is some guarantee of the special nature of the reference. Cf. M. Wallaser, *ZII* v. 193 ff.

We are now in a position to understand a third problematic doctrine referred to the *RP*, viz.

> Some say that the voice of the voiced consonants consists of **a**.[1]

This last statement enables us to trace a consistent thread running through the series of apparently eccentric aphorisms, and to relate them precisely to the descriptive framework of the other 'glottal' articulations:

(*a*) **-h** is considered as 'pure breath', liable to modification by the close vowels,[2] and capable either of independent function (= *visarjanīya*) or of providing the appropriate air-stream for the voiceless consonants.[3]

(*b*) **h** is considered as 'breath+voice',[4] liable to modification by the close vowels,[2] and capable either of independent function (= *hakāra*) or of providing the appropriate air-stream for the voiced aspirates.[3]

(*c*) **a** is considered as 'pure voice', liable to modification by the close vowels, and capable either of independent function (= *avarṇa*) or of providing the appropriate air-stream for the voiced consonants.

Artificial as such a descriptive basis may appear, it is in fact not so very remote from some statements of the most recent branch of phonetic analysis, 'acoustic phonetics'; the following may be quoted for comparison:

> We therefore discuss vowel production on the hypothesis that the glottis emits a spectrum that is independent of supra-glottal articulation, and that the filtering which determines the ultimate vowel spectrum is independent of the glottal adjustment; that is, the original production and the articulatory modification of the glottal tone are entirely independent of each other. The spectrum of the vowel as it exists in the open air is to be reckoned, then, as the glottal spectrum multiplied for each frequency by the transmission percentage of the articulatory filter.[5]

Two thousand years and more before the sound-spectrograph, '**a**-sound' was not an unreasonable substitute for the fiction of a pure 'glottal spectrum'.[6]

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[1] xiii. 15. *āhur ghoṣaṃ ghoṣavatām akāram eke. . . .*

[2] Cf. *TP* ii. 47–48 (see 2.00 above).

[3] Cf. *AP* i. 12; *RP* xiii. 1–6; *TP* ii. 9–10 (see 1.20 above).

[4] See 1.20 above.

[5] M. Joos, *Acoustic Phonetics*, p. 39.

[6] For discussion of the concept of **a** as the 'natural vowel' or '*princeps vocalium*' see Sievers, *Phon.*, §§ 197 ff.; cf. also Jakobson in Trubetzkoy, *Principes*, p. 376;

With regard to **a** it remains only to mention that in later treatises, owing to the extension of the term *kaṇṭhya* (see 2.01 above), **a** (like **h** and **-h**) is grouped with the velar series,[1] thus adding considerably to the symmetry of the *varṇa-samāmnāya* at the expense of phonetic precision.

2.11. i, u

The close front quality **i** is appropriately classified as 'palatal' (*tālavya*),[2] and the *TP* says more specifically,

> For **i**-quality the middle of the tongue is approximated to the palate.[3]

The close back quality **u** is classified by the lip- rather than the tongue-position, viz. as 'labial' (*oṣṭhya*);[4] the shape of the lips is variously referred to as 'approximated', i.e. rounded,[5] or as 'long', i.e. protruded.[6]

2.12. ṛ, ḷ

As to the pronunciation of the vocalic **ṛ** and **ḷ**, the ancient statements are perhaps not as clear as we could wish, but their general trend is easily followed. Their places of articulation have already been discussed above. In distinction from the other vowels they are referred to as 'mixed',[7] i.e. combining features of vowel and

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Brøndal, *Proc. 3rd Int. Cong. Phon. Sc.*, pp. 49 ff.; *TCLP* vi. 62 ff. In the *Anthropos-Lautschrift* **a** is the '*vocalis indifferens*' (see M. Heepe, *Lautzeichen*, p. 6).

Cf. further Millet's observations on the role of the pharyngal resonator and its timbre—*L'Articulation des voyelles*, p. 3: 'Nous considérons la bouche . . . comme le générateur efficace, le résonateur déterminant de la résonance vocalique; la cavité pharyngienne donne son timbre à la voix seulement qui enveloppe celui de la voyelle'; and *Étude expérimentale de la formation des voyelles*, p. 68: 'Il n'est pas de timbre de voyelle qui ne soit accompagnée du timbre de la voix.' Allowing for the fact that the Indians seem not to have differentiated pharynx and larynx, we may say that their conception of **a** was, in Millet's terminology, that of a pharyngal timbre without buccal determination.

We may here note that a similar device was adopted in India with reference to nasality, *anusvāra* being treated as 'pure nasality', forming the basis of all nasal sounds (*RP* xiii. 15. . . . *anusvāram anunāsikānām*).

[1] E.g. *Siddh. Kaum.* 10 (cf. 2.01 above). Some authorities even gave to it the title *jihvya*, which means specifically 'velar' (see *Āp. Ś.* i. 10).

[2] *PŚ* 17. *i-cu-ya-śās tālavyāḥ* Cf. Sweet, *Primer*, § 33.

[3] ii. 22. *tālau jihvā-madhyam ivarṇe.*

[4] Cf. *PŚ* 17. *oṣṭhajāv u-pū.*

[5] *TP* ii. 24. *oṣṭhopasaṃhāra uvarṇe.*

[6] *VŚ* 284. *uvarṇa-prakṛter oṣṭhau dīrghau.*

[7] *VŚ* 11.

consonant (**r/l**);[1] for this reason some writers even refused to admit them to the vowel-system.[2] There is general agreement that their phonetic structure is of the type: consonantal element—vocalic element—consonantal element;

> **r̥** contains **r** (as also does the first half of **r̥̄**) . . . and the **r** is in the middle.[3]

> The characteristic of **r̥** is that it is compounded of four segments; of these the first and last are vocalic, whilst the central pair are consonantal, viz. particles of **r**.[4]

In this connexion it is of interest to compare such Avestan parallels as *pərəθu* beside Skt. **pr̥thu**, *kərəp-* beside **kl̥p-**.[5] As to the quality of the vocalic element, the *VP* states that **r̥** and **l̥** consist of **r** and **l** blended into one unit with the vowel **a**.[6]

Regarding the method of combining the vocalic and consonantal elements we may note as an example of picturesqueness rather than illumination the statements quoted by the commentary on the *AP*, which declare that they are connected

> like a nail on the finger, or a pearl on a string, or a worm in the grass.[7]

2.13. e, o; ai, au

It will be convenient to consider in conjunction the *guṇa* and *vr̥ddhi*[8] vowels **e/o** and **ai/au**. The latter, as the transcription suggests, are diphthongs and are regularly so described; the former also were historically diphthongal[9] and continued to function as such for certain phonological purposes (e.g. **vijɲaaya+idam = vijɲaayedam**). But there are indications that whereas the phonological value of **e/o** was **a+i/u**, that of **ai/au** was once **aa+i/u**: this distinction may be illustrated by junctions of the type

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[1] Cf. *AP* i. 37, 39. *saṃspr̥ṣṭa-repham r̥varṇam . . . salakāram l̥varṇam. Āp. Ś.* i. 26. *sarepha r̥varṇaḥ.*

[2] Cf. Kaiyyaṭa on *Mbh.* I. i. 4, on *Pāṇ.* I. i. 9. *anye tu īṣat-spr̥ṣṭa-karaṇatvād anayor r̥kāra-l̥kārayoś ca vivr̥tatvāt tābhyāṃ tayor agrahaṇād anactvam āhuḥ.*

[3] *RP* xiii. 34. *repho 'sty r̥kāre ca parasya cārdhe pūrve . . . madhye saḥ* (cf. *AP* i. 38. *dīrgha-plutayoḥ pūrvā mātrā*).

[4] *Sarvasaṃmata-Śikṣā* 19.

r̥kārasya svarūpaṃ hi śliṣṭaṃ pāda-catuṣṭayam
pādeṣu teṣu vijñeyāv ādāv ante svarātmakau
aṇū rephasya madhye tu vijñeyau vyañjanātmakau.

[5] Cf. also Pkt. *kilitta* < **kl̥pta**, and Oldenburg, *ZDMG* lxi. 835.

[6] iv. 148. *r̥-l̥-varṇe repha-lakarau saṃśliṣṭāv a-śruti-dharāv eka-varṇau.* For the quality of the vowel in Middle Indian developments see 2.03 above.

[7] On *AP* i. 37. *yathāṅgulyā nakhaṃ tathā sūtre maṇir ivety eke tr̥ṇe krimir iveti ca.*

[8] See 0.41 above.

[9] Cf. Gk. *οἶδα*, Av. *vaēdā* beside Skt. **veda**, &c.

nagare+iha = nagara iha

beside **striyai+uktam = striyaa uktam.**[1]

From the phonetic standpoint **e/o** are represented at a still comparatively early period by simple long vowels intermediate in quality between **aa** and **ii/uu**.

To consider now the ancient descriptions: the term for the diphthongs (including **e/o**) is *saṃdhy-akṣara*, 'compound vowel', in contrast to *samānākṣara*, 'simple vowel'. **ai** and **au** are designated respectively 'glotto-palatal' and 'glotto-labial'[2]—as the *VP* says,

> In **ai** and **au** the first mora is glottal and the second palatal or labial;[3]

both the *AP*[4] and the *VP*[5] point out, however, that

> Although diphthongs are combinations of vowels, they are treated as single letters.

As regards **e** and **o**, the *PŚ* seems to preserve the tradition of a diphthongal pronunciation (distinct from that of **ai** and **au**):

> In **e** and **o** the glottal element has a length of ½-mora and in **ai** and **au** 1 mora;[6]

the passage continues with the words '*tayor vivṛta-saṃvṛtam*', literally 'in them there is openness and closeness', which Ghosh interprets as referring to the fact that, in **ai** and **au**, 'their first half or the *a*-element is open and the second half or *i*- and *u*-element is close'; but it is more probable that the words refer to the open **aa** which forms the first element of **ai/au** and the closer **a** which forms the first element of the narrower diphthongs **e/o**.[7] The latter interpretation is supported by a passage in the *Mahābhāṣya*, where the *saṃvṛta* **a** of **e/o** is specifically contrasted with the more open **aa** of **ai/au**.[1]

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[1] Note, however, that the attested sandhi of both **a** and **aa+i/u** is **e/o** (e.g. **baalaa+iikşate = baalekşate**).

[2] *PŚ* 18. *e-ai tu kaṇṭha-tālavyā o-au kaṇṭhoṣṭhajau smṛtau.* Cf. *Āp. Ś.* i. 12–13.

[3] i. 73. *aikāraukārayoḥ kaṇṭhyā pūrvā mātrā tālv-oṣṭhayor uttarā.* Cf. *RP* xiii. 38–39. *saṃdhyāni saṃdhy-akṣarāṇy āhur eke dvi-sthānataiteṣu tathobhayeṣu: saṃdhyeṣv akāro 'rdham ikāra uttaraṃ yujor ukāra iti śākaṭāyanaḥ.*

[4] i. 40. *sandhy-akṣarāṇi saṃspṛṣṭa-varṇāny eka-varṇavad vṛttiḥ.*

[5] iv. 145.

[6] Ghosh, Reconstructed text, 13.

ardha-mātrā tu kaṇṭhyasya ekāraukārayor bhavet
aikāraukārayor mātrā . . .

[7] For the distinction of the two varieties of diphthong one may compare the Nepali 'falling' type (**ai/au**), where the first element is considerably the more prominent, and the narrower **əy/əw** ([əe]/[əo]), with closer and relatively less prominent starting-point—e.g. **bhaile** beside **məyle**. There is also some

The monophthongal pronunciation of **e/o** seems to be indicated by the *RP* when it says that they are not, like **ai/au**, heard as a distinct sequence, because of the coalescence (*saṃsarga*) of their parts:[2] as Uvaṭa goes on to explain,

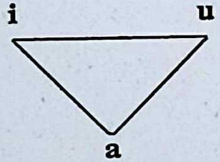
> One does not observe where the **a** ends and the **i** or **u** begins, because the two coalesce like milk and water,[3]

a type of combination which Kaiyyaṭa, continuing the traditional simile, contrasts with the mixture of sand and water.[4]

There is little in the way of detailed descriptions of the monophthongal articulation of **e/o**. The *TP*, however, mentions that for **e** the lips are more spread and for **o** more rounded than in the case of **a**;[5] and the intermediate degree of closure for **e** (between **a** and **i**) is stressed by the *Tribhāṣyaratna*:

> In **e** the raising of the middle of the tongue towards the palate is less than in the case of **i**, owing to the fact that the former is mixed with **a**.[6]

It will be noted that even where the monophthongal value of **e/o** is phonetically established, the feeling for its phonological equivalence to **a+i/u** still prevails, and the basis of description is still provided by the simple framework



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alternation of the second type with a monophthongal realization **e**—e.g. **dhere**, 'much, many; very', beside **səbəy**, 'all', where the final **-e** and **-əy** are morphologically comparable.

[1] I. i. 4, on *Pāṇ*. I. i. 9 (Kielhorn, i. 62). *praśliṣṭāvarṇāv etau* (sc. *eṅ*): *vivṛtatarāvarṇāv etau* (sc. *aic*).

[2] xiii. 40. *mātrā-saṃsargād avare 'pṛthak-śrutī.*

[3] *avare pūrve e o ity ete mātrā-saṃsargāt: mātrayoḥ samayoḥ kṣīrodakavat saṃsargāt na jñāyate kvāvarṇa-mātrā kva vevarṇovarṇayor iti.*

[4] On *Mbh*. I. i. 4. (*paṃsūdakavat*).

[5] ii. 13–15. *okāre ca: oṣṭhau tūpasaṃhṛtatarau: īṣat-prakṛṣṭāv ekāre.*

[6] On ii. 23. *ivarṇe yathā jihvā-madhyopasaṃhāro na khalv evam ekāre kiṃ tu tato nyūna ity arthaḥ: kutaḥ: akāra-miśritatvād ekārasya.*

PART III

PROSODIES

3.0. *Definition*

In the technique of letter-abstraction various features of the larger units of utterance are left unaccounted for. It is the reintegration of these features that forms one of the tasks of synthesis, and it is to them that the title of 'prosody' is here applied.[1] The ancient accounts of these prosodic features will be considered under the following headings:

1. Features of junction (*sandhi*).[2]
2. Features of syllable-structure.

3.1. *Junction*

The nature of our material makes it convenient to work with the following sub-divisions:

(*a*) Word- and morpheme-junction.
(*b*) Letter-junction.

The treatment of word-junction and morpheme-junction under the same heading is justified by the close parallelism of the two classes of prosodies in Sanskrit,[3] as also by the stated principles of our treatises, e.g.

> Unless directed to the contrary, one should treat the parts of a word as words.[4]
>
> Morphological analysis must observe the same rules of finality as apply to word-isolates.[5]

In both (*a*) and (*b*) certain of the prosodic features are relatable to the basic processes considered in Part I; this is only to be expected in view of the fact that these processes had been arbitrarily segmented by the letter-analysis, and have to be restored in the synthesis here considered.

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[1] See further J. R. Firth, 'Sounds and Prosodies', *TPS*, 1948, pp. 127 ff.

[2] Cf. *VP* iii. 3. *padānta-padādyoḥ sandhiḥ.*

[3] For divergences cf. Whitney, *Skt. Gr.*, § 109; Thumb, *Hdb. des Sanskrit*, § 168.

[4] *RP* i. 61. *apratyāmnāye padavac ca padyān.*

[5] *VP* i. 153. *avagrahaḥ padāntavat.*

डा० विद्या निवास मिश्र
प्राध्यापक, भाषा विज्ञान
निजी पुस्तकालय
पुस्तक संख्या ....

3.10. *Word- and Morpheme-junction* (cf. also 0.40)

In the synthesis of the word-isolates certain of the features affecting initials and finals are capable of description in terms of letters: the fact, for example, that the junction-form of **tat+ca** is **tacca**, may be and is described in terms of a 'replacement' of the isolate-final **-t** by **-c**. Other features are describable, as we have just noted, by reference to an extension or transference of certain processes such as were designated 'distinctive features' of the various letters; this is more particularly the case with the extra-buccal processes—e.g.

Voicing: **aasiit+raajaa = aasiidraajaa**
Aspiration: **labh-+-ta = labdha**
Nasalization: **vaak+mama = vaaŋmama.**

The ancient methods of stating these features provide little of interest, and since it is with the statements and not with the phonology itself that we are primarily concerned, they need not be repeated here; the information is in any case readily available in the *sandhi* section of any Sanskrit grammar—Macdonell makes the useful classification into 'Changes of Position' (i.e. junctional prosodies of *sthāna*, such as in **tacca** above) and 'Changes of Quality' (i.e. junctional prosodies of *prayatna*).

One exception is provided by the prosody of retroflexion,[1] more particularly in its application to morpheme-junction. Where the process of retroflexion is indicated by a non-*sparśa* letter (i.e. by **r**, **ṛ**, or **ʂ**) the process continues within the word until an interfering articulation is initiated (as e.g. in **pra-paat-ana**) or the process is 'signed off' by a retroflex stop (as e.g. in **pra-piiɖ-ana**): if, however, an apical nasal appears in the sequence, it is realized with retroflexion and so closes the process; thus when to the verbal root **rabh-** are added the morphemes **-ya-** and **-maana**, the result is **rabh-ya-maaɳa.** The ancient phoneticians were aware of the remarkable nature of this prosody, and the *RP* and *VP* employ for it the special term '*nati*',[2] lit. 'bending, curvature'.

The term 'interfering articulation' referred to above is taken from the *RP*'s discussion of this prosody.[3] It refers, as Uvaṭa points out, to the three middle *vargas*,[1] viz. palatal, dental, and the retroflex series itself. The full appropriateness of the term will be at once appreciated by any phonetician who has been concerned with palatography; in investigating by this method words which illustrate a particular feature of articulation, one has to restrict one's examples to those cases where no interference is caused by other articulations such as would involve a further wipe-off on the artificial palate.[2]

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[1] See further *BSOAS* XIII. iv. 939 ff.

[2] *RP* v. 61. *eṣā natir dantya-mūrdhanya-bhāvaḥ.*
VP i. 42. *dantyasya mūrdhanyāpattir natiḥ.*

[3] v. 56. *avyavetaṃ vigrahe vighna-kṛdbhī rephoṣmāṇau sarva-pūrvau yathoktam.*

Certain features of word-junction were found by our authors to require description in terms other than those of processes or of phonematic units. This is outstandingly the case where, so far as the letters are concerned, a 'hiatus' (*vivṛtti*) is left between a final **a**-vowel and an initial vowel. Examples of this type of junction are—

te+aa = ta aa
prabho+ihi = prabha ihi
paadau+ucyete = paadaa ucyete
tasmai+akṣii = tasmaa akṣii
sutaah+ime = sutaa ime
khyah+aa = khya aa
vidvaan+agne = vidvãã agne

Beside these forms, however, we also find the following alternatives written:[3]

te+aa = tay aa
prabho+ihi = prabhav ihi
tau+indraagnii = taav indraagnii

(this last is the regular treatment before vowels other than **u**).

In the above cases historical justification can be found for the **y** and **v** (**e/o**<**ai/au*, &c.; cf. 2.13 above), and the distribution of **y** and **v** is in accordance with the historical facts (thus we do not find **tav aa** or **prabhay ihi**). But in the phonetic treatises we find similar prescriptions for those cases where no such historical evidence can be adduced. Thus with reference to examples of the type **sutaah +ime** and **khyah+aa** above, we find the statement that

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[1] *na madhyamaiḥ sparśa-vargair vyavetam.*

[2] See especially J. R. Firth, 'Word-Palatograms and Articulation', *BSOAS* xii. 857 ff. (p. 859: 'For the study of articulations in this way the selection of utterances is determined by knowledge that some articulations, bi-labials, for example, give no palatogram, and others homorganic or non-interfering articulations').

The fact that **y**, as against **ʃ**, functions as non-interfering is incidentally a further argument against the Indian doctrine of a greater degree of contact for this semivowel than for the fricative; **l**, however, like **s**, functions as an interfering articulation (cf. remarks on pp. 27–28 above).

[3] Cf. Wackernagel, *Ai. Gr.* i, §§ 272 ff.

> **-h** before an initial vowel > **-y**,[1]

suggesting junction forms **sutaay ime, khyay aa**, &c.: and with regard to the type **vidvaan+agne,**

> **-aan** before an initial vowel > **-ããy**,[2]

suggesting **vidvããy agne**, &c.

But whether written or unwritten, and whether historically justifiable or not, the quality of this 'final' **y** or **v** was observed to differ from that of the phonematic letters **y** and **v** in initial and medial position. As the *Pratijñā Sūtra* says,

> **v** has three realizations, viz. tense in initial position, medium in medial position, and lax in final position.[3]

The lax articulation of these sounds is mentioned by Pāṇini in a statement ascribed to Śākaṭāyana, where they are described as '*laghu-prayatnatara*', i.e. 'having a lighter articulatory process'[4]—a statement interpreted as follows by the *Siddhānta-Kaumudī*:

> A light articulation is one in which there is a relaxation of the tip, the rim, the middle, or the root of the tongue.[5]

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[1] *TP* ix. 10. *atha svara-paro yakāram*. Cf. *AP* ii. 41. *svare yakāraḥ*. This is in fact a rather misleading way of stating the matter, and similar obliquities still mar the presentation of *visarga*-sandhi in modern grammars. The forms with final **-h** are absolute finals only, and elsewhere the starting-point for the sandhi is ***-as**, &c. The final ***-s** follows the general sandhi laws as regards voicing before voiced initials—e.g. (i) ***-as+ĝ-** > ***-az ĝ-**: (ii) ***-as+i-** > ***-azi-**; but voice and friction being mutually incompatible in Skt. (cf. p. 44, n. 4), the syllable patterning is maintained where necessary by the use of **y** or **w** prosodies, which in (i) provide a vocalic closure maintaining the heavy quantity of the syllable (***-az ĝ-** > ***-a^{w} ĝ-** > **-o ĝ-**), and in (ii) a mode of vowel-separation (***-azi-** > **-a^{y}i-**). The **w**-prosody is generalized before consonants and the **y**-prosody before vowels, though in the former case signs of a **y**-closure are preserved in 'fossilized' phrases and in internal position (e.g. **suure duhitaa** < ***suuras+duhitaa, seduh** < ***sa-zd-uh**; cf. also the Māgadhī development of **-ah** > **-e**). In the case of a final retroflex fricative, the prosody is also of retroflex type (***-iş** > ***-iʐ** > **-i^{r}**, &c.), and is indicated by the symbol for the phonematic retroflex continuant **r** (cf. 2.03 above)—e.g. ***manuş+naama** > **manurnaama, *agniş+iva** > **agniriva**, &c.

[2] *VP* iii. 142. *ākāropadho yakāram.*

[3] 17. *athāntyasyāntasthānām padādi-madhyānta-sthasya tri-vidhaṃ guru-madhyama-laghu-vṛttibhir uccāraṇam.* Cf. 1.112 above.

[4] VIII. iii. 18. *vyor laghu-prayatnataraḥ Śākaṭāyanasya.*

[5] 168. *yasyoccāraṇe jihvāgropāgra-madhya-mūlānāṃ śaithilyaṃ jāyate sa laghūccāraṇaḥ.*

Śākaṭāyana is elsewhere quoted as referring to this articulation as 'a reduced realization or slight contact'.[1] Various other views are reported by the *TP*, which, having given the orthodox doctrine of hiatus, ascribes to Ukhya the full articulation of **y/v**, to Vātsapra reduced realization, to Sāṃkṛta the realization of **v** but not **y**, and to Mācākīya the loss of **y/v** when followed by **u** or **o**.[2] The *RT* refers to these features as 'half-elided **y** and **v**',[3] whilst the *RP* gives to the **v** the peculiar title of '*bhugna*', lit. 'bent'.[4]

What our treatises are in fact describing is not the phonematic **y/v** but the **y/v** junction-prosodies—as Uvaṭa rightly says of the '*bhugna*' **v**, it is simply a 'mode of junction' (*saṃdhāna*);[5] for, as he elsewhere remarks of the **y**-prosody, 'if it were not there, how could the coalescence of the two vowels be avoided?'[6] The weak articulation of these prosodic markers is closely paralleled by the *ya-śruti*, 'y-sound'[7] or *ya-tva*, 'y-ness'[8] which serves as a syllable-divider in Prakrit, and by the **y/v** of, for example, the Hindi verbal forms **aya, ave** (infin. **a-na**; beside e.g. **bəyʈha, bəyʈhe**, infin. **bəyʈh-na**).[9]

3.11. *Initiality and Finality*

Closely related to features of junction are features of initiality and finality in the breath-group. On the negative side, the *RP* lists those articulations which are excluded from the initial or final position and so indicate non-initiality or non-finality.[10] But positive statements are few.

Whitney, in a criticism of Lepsius, wrote,

> We are not aware that the Hindu grammarians themselves—acute and

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[1] *AP* ii. 24. *leśa-vṛttir adhisparśaṃ Śākaṭāyanasya.*

[2] x. 19–23. *lupyete tv avarṇa-pūrvau ya-va-kārau: nokhyasya: vakāras tu sāṃkṛtasya: ukāraukāra-parau lupyete mācākīyasya: leśo vātsaprasyaitayoḥ.*

[3] 161. *ardhaṃ vā* (sc. *vakāra-yakārayor lumpanti*).

[4] ii. 31. *oṣṭhya-yonyor bhugnam anoṣṭhye vakāro 'trāntarā-gamaḥ.*

[5] *bhugnaṃ nāma caitat saṃdhānaṃ bhavati.*

[6] On *VP* iii. 142. *yadi hi yakāro vyañjana-kāryaṃ na kuryāt katham iha svarayoḥ sandhir na syāt.* In fact there are a few instances where the prosody is omitted, with resultant coalescence: in the *RV* this is particularly the case with the pronoun **sa** (**sed** for **sa id**, &c.); the *RP* mentions this pronunciation as a fault (xiv. 60). Even when not indicated phonematically, the inter-word space or the non-coalescence of adjacent vowels may be considered as a mark of the junction-prosody.

[7] Hemacandra, i. 180.

[8] Caṇḍa, *Prākṛtalakṣaṇa*, iii. 35; cf. *Tribhāṣyaratna* (MS. Bodl.) on *TP* ix. 10.

[9] Cf. Firth, *TPS*, 1948, p. 145.

[10] xii. 1–2.

> hairsplitting as they were in catching and noting the finest shades of sound, and much as they would have been delighted with, and made the most of, just such a nicety as this—ever took any notice of a smooth breathing.[1]

By 'smooth breathing' Whitney meant the glottal onset of an initial vowel, but this statement is probably not entirely accurate, for in the *VŚ* we in fact find the isolated and notable observation,

> At the beginning of vowels which are not preceded by a consonant, the glottis is said to be the place of articulation.[2]

It seems not unreasonable to interpret these words as referring to the particular feature of initiality in question.

There are also some remarks of interest in connexion with final consonants. The general rule is that of the non-nasal *sparśas* only the voiceless unaspirated stops may occur finally *in pausa*:[3] but on this matter there seems to have been some divergence of opinion.[4] The *RP* quotes Śākaṭāyana for the orthodox view,[5] but attributes to Gārgya the doctrine that stops in this position were voiced,[6] and Pāṇini permits either pronunciation.[7] The truth of the matter may well lie in the view somewhat abstrusely stated by the *AP*:

> Words ending (sc. according to orthodox doctrine) in voiceless stops, end according to Śaunaka in voiced stops, but they are not so treated (sc. phonologically); they have lax contact.[8]

This observation is perhaps to be interpreted as indicating a realization as voiceless stops, but with the lax articulation characteristic of the voiced stops (i.e. as g̊, ḍ̥, d̥, b̥). Graphically they are always represented by the voiceless series. For further observations on final consonants see below under 3.120 (*abhinidhāna*).

3.12. *Letter-junction*

We are here concerned with those features of transition from letter to letter which may be considered without regard to the question whether a word- or morpheme-junction is also involved.

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[1] *JAOS* vii. 328.

[2] 285 (Lüders, p. 93). *avyañjana-svarāṇāṃ ca ādau kaṇṭha itīritaḥ.* Cf. Varma, op. cit., pp. 185 f.

[3] e.g. *AP* i. 6. *sparśāḥ prathamottamāḥ.*

[4] In recent times similar disagreements, regarding Lithuanian finals, are to be found in the accounts of Schleicher (*Gr.*, p. 27), Kurschat (*Gr.*, § 175), Leskien (*Lesebuch*, § 30).

[5] i. 16. *prathamaṃ Śākaṭāyanaḥ.*

[6] i. 15. . . . . *avasāne tṛtīyaṃ Gārgyaḥ sparśam.*

[7] viii. iv. 56. *vāvasāne.*

[8] i. 8–9. *prathamāntāni tṛtīyāntānīti Śaunakasya pratijñānaṃ na vṛttiḥ: adhisparśaṃ ca. . . .*

These are principally related to various types of consonant-group. The general term for a group is *saṃyoga* or 'conjunction',[1] but the term *piṇḍa*, 'ball, block', is also used in later treatises. The various types of *piṇḍa* are classified according to their composition by the *Yājñavalkya-Śikṣā* under fanciful and largely irrelevant titles such as 'iron', 'flame', 'wool', &c.[2] It is of some interest, however, to note that both the *YŚ* and the *Varṇaratnapradīpakā Śikṣā* describe the combination stop+semivowel as a 'block of wood' (i.e. which can easily be broken) on account of the 'laxity of their junction' (*ślatha-bandha*);[3] in the Greek and Latin grammarians we find groups of this type compared to a 'mixed yoke' (e.g. ass and ox, or ass and mule), the tractive effort of which is less than that of two similar yoke-mates.[4] In the Western examples the simile refers to the fact that such a group optionally fails to 'make position' in verse: no such option generally prevails, however, in the case of Vedic or Classical Sanskrit,[5] and there is only doubtful evidence from Buddhist Sanskrit[6] and the statements of late metrical writers such as the 'Prakrit Piṅgala'.[7]

3.120. *Consonant+stop* (*abhinidhāna*)

One of the most important features noted by our treatises goes by the title of *abhinidhāna*, 'close contact'. This refers to the non-release of a consonant, more particularly a stop, when followed by a stop, and parallels the French term 'implosion'.[8] The significance of the term is indicated by the Indian statements, e.g.

> *Abhinidhāna* is the checking of a consonant, making it obscure,

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[1] Cf. *AP* i. 98. *vyañjanāny avyavetāni svaraiḥ saṃyogaḥ.*

[2] 202 (*ŚS*, p. 29). *atha sapta-vidhāḥ saṃyoga-piṇḍāḥ. . . .* See also Varma, op. cit., p. 145.

[3] *Varṇ. Ś.* 177–8 (*ŚS*, p. 133).

sparśā apañcamā ye cāntasthābhiś ca saṃyutāḥ
dāru-piṇḍena te tulyāḥ ślatha-bandhāḥ prakīrtitāḥ.

Cf. *YŚ* 202. . . . *sāntasthān dāru-piṇḍavat.*
The term *ślatha-bandha* is used of various other combinations by the *Śaiśirīya-Śikṣā* (72, 76).

[4] Cf. Mar. Victorinus, Keil, vi. 38; Schol. on Hephaestion, *Enchiridion*, ed. Westphal, pp. 108 f.

[5] But see Meillet, 'Valeur des groupes -*TR*- en Sanskrit', *MSL* xviii. 311 ff., and cf. 3. 21 below.

[6] Cf. Varma, op. cit., pp. 95 ff.; Edgerton, *BSOAS* viii. 507 f.; *JAOS* lxvi. 197 ff., *Kuppuswami Sastri Commem. Vol.*, pp. 39 ff.

[7] Cf. Weber, *Ind. St.* viii. 224 (on Piṅgala, *Chandaḥ Sūtra* i. 9 ff.).

[8] Cf. Grammont, *Traité*, pp. 36 ff. For a full appreciation see Rosapelly, *MSL* x. 347 ff.

> weakened, deprived of breath and voice; it takes place when a stop is followed by a stop; it is also called 'arrested' (*āsthāpita*).[1]
>
> In the case of stops and semivowels (except r) followed by stops, *abhinidhāna* takes place, i.e. a restraint or obscuring of the sound; it also occurs *in pausa*.[2]

The extension of the term *abhinidhāna* to finals *in pausa* is also of interest; the description of them as 'obscure, weakened, deprived of breath and voice' goes far to explain the divergent views quoted above regarding their voicing or non-voicing.[3] The doctrine of unreleased final stops is strongly supported by the comparative evidence adduced by Gauthiot in his *La Fin de Mot en IE*,[4] as also by later Indo-Aryan developments.[5]

In the *RP* we also find a description of the stop-elements of the *abhinidhāna* consonants which distinguishes between voiced and voiceless:

> The sound which follows the closure of an unreleased (voiced) stop is called '*dhruva*', and it continues for the duration of the stop; in the case of a voiceless stop the *dhruva* is not audible; and in the case of a nasal it is nasalized.[6]

'*Dhruva*', lit. 'continuance', is parallel to the '*tenue*' of French phoneticians.[7] The Indian observation compares favourably with a modern statement such as,

> While the organs articulating a plosive consonant are actually in contact they form what is called the *stop*. In the case of voiceless consonants nothing whatever is heard during the stop: in the case of voiced consonants some voice is heard during the stop.[8]

The stop-element is, of course, not only a feature of the unreleased stops: but in other positions our authorities speak of the contact as only 'momentaneous'[1] and so not deserving special description; they take note, however, of the especially brief and light flap-articulation of intervocalic voiced retroflex stops.[2]

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[1] *AP* i. 43–44, 48. *vyañjana-vidhāraṇam abhinidhānaḥ pīḍitaḥ sannataro hīna-śvāsa-nādaḥ: sparśasya sparśe 'bhinidhānaḥ: āsthāpitaṃ ca.*

[2] *RP* vi. 17–18. *abhinidhānaṃ kṛta-saṃhitānāṃ sparśāntasthānām apavādya rephaṃ saṃdhāraṇaṃ saṃvaraṇaṃ śruteś ca sparśodayānām: api cāvasāne.* Cf. *VP* iv. 165, and Sarma, *Critical Studies on Kātyāyana's Śuklayajurvedaprātiśākhya*, p. 195.

[3] Cf. Prasad, op. cit., p. 262, 'The articulation of the utterance-finals in Bhojpurī is very lax and they are pronounced with weak breath or voice' (cf. Kymogram No. 93, a:g).

[4] Chap. v.

[5] Cf. Bloch, *L'Indo-Aryen*, pp. 75 f.

[6] vi. 39–41. *nādaḥ paro 'bhinidhānād dhruvaṃ tat tat-kāla-sthānam: aśruti tv aghoṣāt: nāsikā-sthānam anunāsikāc cet.*

[7] Cf. Grammont, *Traité*, p. 49. Cf. also the term *dhāraṇa* used with reference to geminates (*VP* iv. 144. *dvivarṇam ekavarṇavad dhāraṇāt svara-madhye*).

[8] D. Jones, *Outline*, § 562.

3.121. **r**+*consonant* (*svarabhakti*)

A passage of the *RP* quoted above excluded **r** from the effect of *abhinidhāna*; this exclusion finds its explanation in the following statement:

> After **r** standing between a vowel and a consonant, a vowel-fragment (*svara-bhakti*) of **ṛ**-quality is inserted.[3]

This doctrine of *svarabhakti*, 'anaptyxis', is elsewhere restricted to the sequence **r**+fricative[4] (in some treatises also **l**+fricative).[5] The most detailed statement is that of the *AP*:

> Between **r** and a prevocalic fricative, a *svarabhakti* is pronounced having the length of $\frac{1}{2}$ or $\frac{1}{4}$ of **a**; before other consonants (than fricatives) its length is $\frac{1}{4}$ or $\frac{1}{8}$ of **a**.[6]

Regarding the greater length of the *svarabhakti* in the sequence **r**+fricative, it is to be noted that manuscripts of the *AV* write vocalic **ṛ** for **r** in such cases;[7] the metre also occasionally requires the pronunciation of a vowel which is not noted in our texts (e.g. **darʃata** = 4 syllables).[8]

As to the quality of the *svarabhakti* vowel our treatises show wide variation; apart from **ṛ** we find **a**, **i**, **e**, and **u** mentioned:[9] the *RP* also states that it may take on the colour of a preceding or following vowel.[10]

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[1] Cf. *RP* xiii. 9. *spṛṣṭam asthitam.*

[2] e.g. *Śaiśirīya-Ś.* 22. *duspṛṣṭaś ceti vijñeyo ḍa-ḍhayoḥ svara-madhyayoḥ* (in the *RP* (see 1.110 above) *duḥspṛṣṭa* = *īṣatspṛṣṭa* and is used to describe the articulation of the semivowels). Cf. also *VP* iv. 146. *ḍa-ḍhau ḷa-ḷhāv ekeṣām*; *RP* i. 52. For a kymographic study of this feature in Gujarati see T. N. Dave, *BSOAS* vi. 673 ff.

[3] *RP* vi. 46. *rephāt svaropahitād vyañjanodayād ṛkāra-varṇā svarabhaktir uttarā.*

[4] e.g. *TP* xxi. 15. *rephoṣma-saṃyoge repha-svarabhaktiḥ.*

[5] e.g. *VP* iv. 17. *ra-lāv ṛ-ḷ-varṇābhyām ūṣmaṇi svarodaye sarvatra.* Cf. *Pratijñā Sūtra* 14–15. *athāparāntasthasyāyuktānya-halaḥ saṃyuktasyoṣma-ṛkārair ekāra-sahitoccaraṇam: evaṃ tṛtīyāntasthasya kvacit.*

[6] i. 101–2. *rephād ūṣmaṇi svara-pare svarabhaktir akārasyārdhaṃ caturtham ity eke: anyasmin vyañjane caturtham aṣṭamaṃ vā.*

[7] Cf. Whitney on *AP* i. 102.

[8] Wackernagel, *Ai. Gr.* i, § 50. In Prakrit, on the other hand, a written *svarabhakti* may have zero metrical value (Pischel, § 131; cf. 3.20 below).

[9] Cf. Varma, op. cit., pp. 135 f.; Renou, *Terminologie*, iii. 181.

[10] vi. 53. *pūrvottara-svara-sarūpatāṃ ca.*

The statement of the *AP* on the lengths of the *svarabhakti* vowels goes on to mention as being of length $\frac{1}{8}$ **a** an element referred to as '*sphoṭana*';[1] from a later passage we learn that this occurs in groups where a stop is followed by another of a more back series,[2] especially a velar[3] (e.g. in **vaşaţ-kŗtam, tad ĝaayatre**). Uvaṭa defines the term (which literally means 'splitting') as the (optional) separation of a consonant cluster.[4] This would appear to indicate a type of *svarabhakti*, whether voiced or voiceless, the infinitesimal duration of which is suggested by the specification of a value $\frac{1}{8}$ **a**, in fact a minimal audible release. The mechanism of the feature referred to is perhaps the release of the front closure during the formation but before the completion of the back closure, resulting in the momentary outflow of an air-stream attenuated by the back constriction; it might then be identified with what Pike terms a 'crossing glide':

> When the releasing glide of one stricture is simultaneous with the approaching glide of another, a *crossing glide* is developed. . . . One such audible crossing glide is the sound of open transition between two voiceless or voiced stops; in [apta] a type of crossing-glide aspiration may be heard if the lips begin to open while the tongue is moving toward the alveolar arch.[5]

Prasad in fact reports just such a transition for Sanskrit loan-words in Bhojpurī:

> In the case of such sequences in the tatsama loan-words as pronounced by the educated speakers, the contact is first formed in one position and after that the organs tend to abruptly take up the position for the second consonant before the first is properly released.[6]

If the back closure were completed before the initiation of the front release, the result would be *abhinidhāna*; if the front release were effected before the initiation of the back closure, the result would be full *svarabhakti*.[7]

An exception to the occurrence of *sphoṭana* is mentioned in the case of a retroflex followed by a palatal,[8] where a feature called *karṣaṇa*, lit. 'dragging, extension', is said to take place: the term is further explained as *kālaviprakarṣa*, 'extension of duration'.[1] In the absence of more precise descriptions we can hardly attempt to interpret this isolated statement; we may only note that the author evidently intends to distinguish the transition in question from normal *abhinidhāna* or *svarabhakti*. The term as here employed is thus not to be confused with the *viprakarṣa* of Prakrit grammarians, which refers simply to anaptyxis.[2]

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[1] 103. *tad eva sphoṭanaḥ.*

[2] ii. 38. *varga-viparyaye sphoṭanaḥ pūrveṇa ced virāmaḥ.*

[3] *VP* iv. 165. *sphoṭanaṃ ca kakāra-varge vā sparśāt.*

[4] On *VP*, loc. cit. *sphoṭanaṃ nāma piṇḍī-bhūtasya saṃyogasya pṛthag-uccāraṇam.*

[5] Op. cit., p. 111.

[6] Op. cit., p. 196.

[7] Cf. Pike, loc. cit.

[8] Examples quoted from the *AV* are **şaţ ca, şaḑ jaataa.**

3.122. *Stop + nasal (yama)*

Closely related to the preceding prosodies is the feature referred to by the Indian phoneticians as *yama*, lit. 'twin'. The implications of the term will be discussed after a consideration of its contexts:

> Within a word, when a non-nasal *sparśa* is followed by a nasal, it is separated by the appropriate *yama*.[3]
>
> Non-nasal *sparśas* followed by nasals become their own *yamas*; the *yamas* are in conformity with the *sparśas*.[4]
>
> After a non-nasal *sparśa* followed by a nasal there are inserted the appropriate nasal sounds, called by some *yamas*.[5]

The feature here observed is that generally described as nasal or 'faucal' plosion of the oral stop;[6] the further statement of the *VP* that

> The *yamas* are produced by the root of the nose (*nāsikā-mūla*)[7]

may be brought into line with modern descriptions if we interpret *nāsikā-mūla* as 'velum'. In this type of transition there is a slight nasalization of the oral stop, at least in its latter portion, and so a nasal off-glide to the following nasal.[8] The Indian recognition of this feature has not always been duly appreciated; Whitney writes,

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[1] *AP* ii. 39. *na ṭavargasya cavarge kāla-viprakarṣas tv atra bhavati . . . tam āhuḥ karṣaṇa iti.*

Note also the use of *karṣaṇa* in the *Puṣpasūtra* (ed. Simon, p. 518—'Ziehen, Verlängern einer Silbe über ihre Zeitdauer und über ihren Hauptton hinaus durch Einschieben eines andern oder mehrerer anderer Zwischentöne'), and similarly Uvaṭa in comm. on *VP* i. 124.

[2] Cf. Vararuci, iii. 60.

[3] *AP* i. 99. *samāna-pade 'nuttamāt sparśād uttame yamair yathā-saṃkhyam* (sc. *vyavadhānaṃ bhavati*).

[4] *RP* vi. 29, 32. *sparśā yamān ananunāsikāḥ svān pareṣu sparśeṣv anunāsikeṣu: yamaḥ prakṛtyaiva sadṛk.*

[5] *TP* xxi. 12–13. *sparśād anuttamād uttama-parād ānupūrvyān nāsikyāḥ: tān yamān eke.*

[6] Cf. D. Jones, *Outline*, § 586; Pike, op. cit., p. 58.

[7] i. 82. *nāsikā-mūlena yamāḥ.*

[8] Statements on the syllabication of the *yama* (cf. Varma, op. cit., pp. 79 f. would seem to suggest that there was some lengthening of the stop.

> Phonetic analysis does not, as it seems to me, help us to recognize the *yama* of the Hindu grammarians as any necessary accompaniment of the utterance of a mute and nasal.[1]

Max Müller refers to the Indian statements as 'vollkommen klar und physiologisch begreiflich'; but it is only his own misinterpretation of them that is so pellucid—

> Sie würde eben einfach die Thatsache hervorheben, daß wo ein Nasal auf eine Muta folgt, der Muta selbst ein leichter nasaler *Ansatz vorhergeht*[2] [my italics].

Müller, in fact, as also Regnier,[3] takes the *yama* to be a nasal articulation *preceding* the stop. But the *TP* speaks of the *yama* as occurring '*sparśād*', i.e. *after* the stop,[4] and this is yet more clearly brought out by the *Nāradī Śikṣā*:

> If a non-nasal *sparśa* is followed by a nasal, then a *yama* homorganic with the preceding letter is to be inserted between them.[5]

The number of distinct *yamas* is given by the *PŚ*,[6] the *Tribhāṣyaratna*[7] and Uvaṭa[8] as four, i.e. voiced and voiceless, aspirate and non-aspirate; Uvaṭa mentions and disagrees with a theory that there are twenty[9] (i.e. one for each of the non-nasal *vargīya* letters), and states that only four types are distinguished 'by their own qualities'[10]—a statement of which the precise implication is not clear.

We have no special instructions regarding the realization of the aspirates in such contexts, and must assume that the faucal release was followed by an expulsion of voiceless or voiced breath through the nose;[1] the *RP*, however, objects to the teaching of Gārgya that the *yama* is then followed by a nasal fricative:[2] with the nasal breathing there is likely to be some degree of cavity friction, but the *RP* is perhaps only referring to some objectionable form of local friction.[3]

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[1] On *AP* i. 99. For an appreciation of the *yama*-doctrine cf. Rosapelly, *MSL* x. 354 ff.; also J. Chlumský, *ANPE* xi. 81.

[2] On *RP* 405.

[3] *Journal Asiatique*, Ve Ser. ix, pp. 233 f.

[4] Cf. the *paribhāṣā Pāṇ.* 1. i. 67—*tasmād ity uttarasya.*

[5] *ŚS*, p. 428.

anantyaś ca bhavet pūrvo 'ntyaś ca parato yadi
tatra madhye yamas tiṣṭhet savarṇaḥ pūrva-varṇayoḥ.

[6] 4. . . . *catvāraś ca yamāḥ smṛtāḥ.*

[7] On *TP* xxi. 12. . . . *ānupūrvyād yathā-kramaṃ nāsikyā āgamā bhavanti: prathama-sparśāt prathama-nāsikyaḥ: dvitīyād dvitīyaḥ: evam anyatrāpi.*

[8] On *VP* i. 82. *yamāś catvāraḥ.* . . . Cf. on i. 74, viii. 24.

[9] On *RP* i. 50. *evaṃ viṃśatir yamā bahvṛcānāṃ bhavanti* and vi. 29. . . . *viṃśatitvāt sthāninām ādeśānām api yamānāṃ viṃśatitva-prasaṅgaḥ: sa mā bhūt: caturṇām eva yamānāṃ prathamāḥ prathamaṃ dvitīyā dvitīyam evam ā pañcamād āpadyerann ity ucyate.*

[10] On *RP* i. 50. *svarūpaiś catvāra eva.*

Immediately after the discussion of the *yamas* the *TP* has the rule:

> After **h** followed by **n**, **ɳ**, or **m** is inserted a nasal sound (*nāsikya*).[4]

A similar rule is also found in the *AP*.[5] If, as Whitney assumes, the reference is simply to another *yama*, it is strange that a special rule should be stated, and the *Tribhāṣyaratna* interprets the statement, in spite of its wording, as referring to a nasalization of the **h**,[6] an interpretation which is supported by the explicit statement of the *Sarvasammata-Śikṣā*[7] and, even more significantly, by the *VŚ*.[8] Whatever the precise interpretation of the rule in question, it evidently recognizes the fact that the two processes of breath and nasality may overlap, whether partially or wholly; that this was the case in Sanskrit is strongly suggested by the so-called metatheses in Prakrit developments of the type *bamhaṇa*<**braahmaɳa**, &c.,[9] as also by Pāṇini's optional prescription of junction-forms such as **kin‿hnute** beside **kiŋ hnute**.[10]

As regards the figurative implications of the term *yama*, we perhaps have a hint in the statement of the *VP* that

> Medially a non-nasal stop before a nasal undergoes division (*viccheda*).[11]

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[1] Cf. kymograms by A. C. Sen, *Proc. 2nd Int. Cong. Phon. Sc.*, p. 191.

[2] vi. 37–38. *ūṣmā soṣmaṇaḥ* (Uvaṭa *nāsikā-sthānaḥ*): *varjayet tam.*

[3] As e.g. Pike, *Phonetics*, p. 141, 'Nasals with local friction at the velic are *fricative nasals* (very rare, limited almost to types of rough clearing of the nose)'. Cf. Sweet, *Primer*, § 78, referring to a 'strongly snorted' [ṇ], occurring in 'a not uncommon and very disagreeable form of sniffing'.

[4] xxi. 14. *hakārān na-ṇa-ma-parān nāsikyam.*

[5] i. 99–100. . . . *hakārān nāsikyena* (sc. *vyavadhānaṃ bhavati*).

[6] *tasmān na-ṇa-ma-paraṃ hakāram āruhya nāsikyam bhavati: sānunāsikyo hakāraḥ syād ity arthaḥ.*

[7] 42. *hakāram . . . uttameṣu pareṣv evaṃ nāsikyatvam ihādhikam.*

[8] 298, 301 (Lüders, pp. 88, 93, 101). The nasalization of **h** is, however, prohibited by the *Cārāyaṇīya-Śikṣā* (see Varma, op. cit., p. 80).

[9] Pischel, § 330. Cf. Bharata, *Nāṭyaśāstra*, xvii. 22, *viparītāṃ ha-ma-yoge brahmādau. . . .*

[10] *Pāṇ.* VIII. iii. 26–27. *he ma-pare vā* (sc. *maḥ*): *na-pare naḥ.* Cf. Vārt. on 26, *ya-va-la-pare ya-va-lā veti vaktavyam.*

[11] iv. 163. *antaḥ-pade 'pañcamaḥ pañcameṣu vicchedam.*

Uvaṭa equates the term *viccheda* with *yama*,[1] and it is understandable that in a sequence with nasal plosion, e.g. **[pad^{n}ma]**, the oral stop and its nasal release might have been considered as a division of the **d** into two parts or 'twins' (**[pad^{d}ma]**). In the term *viccheda* we should then have a parallel to the German 'Brechung', a description which at least two scholars have in fact applied to the *yamas*.[2]

3.123. *Fricative+nasal*

In the sequence fricative+nasal one phonetician is reported as observing the insertion of a voiceless stop homorganic with the nasal:[3] thus **kṛʂɳa**, **ɡriiʂma** would be realized as **[kṛʂ^{ʈ}ɳa]**, **[ɡriiʂ^{p}ma]**,[4] the oral closure for the nasal being completed before the lowering of the velum. As both Bloch and Varma have pointed out,[5] this type of transition is strongly supported by developments in later Indo-Aryan.

3.124. *Stop+Fricative*

There are certain peculiarities connected with the sequence stop+fricative. Our treatises mention that the stop may be aspirated,[6] an observation that is to some extent supported by Prakrit developments of the type *macchara*<**matsara**, *khāra/chāra*< **kʂaara**, &c.[7] This treatment, however, is restricted by Śaunaka and Bāḍabhīkāra to those cases where the stop and fricative are heterorganic:[8] by far the most frequent group of this type is **kʂ**, and we may note the Sanskrit alternation of **kʂ-** with **khy-** in the root **kʂaa-/khyaa-**;[9] an identification **kʂ** = **khy** is also required by etymologies in the *Śatapatha-Brāhmaṇa* and in Yāska's *Nirukta*.[10]

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[1] *vicchedo yama iti.*

[2] Weber, *Ind. St.* iv. 123; Trapp, on *Mbh.*, p. 152, n. 190.

[3] *TP* xiv. 11. *uttama-parāt tu Plākṣāyaṇasya* (cf. 9. *aghoṣād ūṣmaṇaḥ paraḥ prathamo 'bhinidhānaḥ sparśa-parāt tasya sasthānaḥ*).

[4] Cf. the transition common in English (e.g. **[sen^{t}s]** = *sense*).

[5] Bloch, *L'Indo-Aryen*, p. 88; Varma, op. cit., pp. 123 ff.

[6] *AP* ii. 6. *dvitīyāḥ śa-ṣa-seṣu.*
RP vi. 54. *ūṣmodayaṃ prathamaṃ sparśam eke dvitīyam āhur.*
TP xiv. 12. *prathama ūṣma-paro dvitīyam.*
Cf. *Nār. Ś.* (*ŚS*, p. 437).

[7] Cf. Pischel, § 316; Varma, p. 73. Note also *AV ŗccharā* beside *VS ŗkṣalā*.

[8] *VP* iv. 122. *asasthāne mudi dvitīyaṃ Śaunakasya.*
TP xiv. 13. *Bāḍabhīkārasyāsasthāna-paraḥ.*

[9] Cf. Bloomfield-Edgerton, *Vedic Variants*, ii. 99 ff.

[10] Cf. Scheftelowitz, *IF* xlvi. 249; *WZKM* xxi. 135 f.

We are also told of a realization as **kʃ**, going back as far as Gārgya.[1] It thus seems likely that the complex which we transcribe as **kṣ** may in fact have been in the nature of an affricate unit not precisely describable in terms of **k** and **ṣ**.[2] Rāmaśarman, in his commentary on the *Pratijñā Sūtra*, points out that it is a single and indivisible letter;[3] this statement simply refers to the fact that it is written in Nāgarī with a single symbol (क्ष or क्ष) which bears no evident relationship to either element (क, ष); but the results of a recent comparative study are of some phonological interest—Sanskrit **kṣ**, as is well known, combines the reflexes of IE **ks* and **kþ*, and Benveniste has now convincingly demonstrated that on structural grounds the latter (**kþ*) must be treated as a single phonological unit.[4]

3.125. *Gemination*

We need not here consider in detail the doctrine of *krama* or 'doubling', which occurs in most of our treatises. This refers to the lengthening of consonants in certain contexts and would be of considerable interest were it not for the fact that ideas regarding the identity of these contexts are so diverse. The matter has been discussed at some length by Varma.[5] The most general agreement is to be found in the case of a consonant preceded by **r**, where both manuscripts and printed works frequently show the double symbol. The 'doubling' has no phonological consequences, and Pāṇini's observations are as follows:

> After **r** or **h** preceded by a vowel, and as the first member of a group, a consonant may be doubled. . . . But according to Śākalya there is no such doubling, and all teachers agree that it is inoperative after a long vowel.[6]

3.2. *Syllable Structure*

3.20. *Vowel and Consonant* (see also 1.112 above)

When considering the processes of articulation we encountered a phonetic criterion for the class of vowels, namely, openness of the buccal articulators. By this criterion h and -h might also be classed as vowels, but such a possibility is excluded by the existence of phonological criteria related to function rather than to mode of articulation. This phonological distinction between vowel and consonant is made in the following statements:

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[1] *VP* iv. 167; *RP* vi. 55 f.

[2] Cf. also the wide variety of developments in Kafiri (Morgenstierne, *Linguistic Mission to Afghanistan*, pp. 58 ff.).

[3] On 19 (ed. Weber, p. 85).

[4] *BSL* xxxviii. 139 ff.

[5] Op. cit., pp. 99 ff. Cf. Fouché, *Études de Phonétique Générale*, p. 56.

[6] VIII. iv. 46. *aco ra-hābhyāṃ dve* (sc. *vā*)
47. *anaci ca.*
51. *sarvatra śākalyasya* (sc. *na*)
52. *dīrghād ācāryāṇām.*
For discussion cf. Wackernagel, op. cit., § 98.

> A vowel forms a syllable;[1]
>
> A vowel with a consonant or even alone forms a syllable;[2]
>
> A syllable is composed of a vowel, together with initial consonant(s) and, *in pausa*, a following consonant;[3]
>
> The consonant is subordinate to the vowel;[4]

which the *Tribhāṣyaratna* augments by saying,

> A consonant is incapable of standing alone, and so is dependent, whereas a vowel is independent.[5]

Thus the vowel is phonologically defined by the fact that it forms a syllable, or the nucleus of a syllable[6]—a criterion for which western antiquity provides parallels:[7] indeed the statement of the *Tribhāṣyaratna* is almost exactly duplicated by that of Dionysius Thrax.[8] One result of this phonological interdependence of syllable (*akṣara*) and vowel (*svara*) is that the term *akṣara* is frequently extended to mean 'vowel'.[9]

The distinction between the phonetic and phonological criteria is further exemplified by the case of *svarabhakti*. We have seen that from the phonetic standpoint this feature is defined as vocalic in character; our sources are careful to add, however, that from the phonological point of view it does not break up the consonant-group nor does it form an independent syllable.[10]

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[1] *AP* i. 93. *svaro 'kṣaram.*

[2] *RP* xviii. 32. *savyañjanaḥ . . . śuddho vāpi svaro 'kṣaram.*

[3] *VP* i. 99–101. *svaro 'kṣaram: sahādyair vyañjanaiḥ: uttaraiś cāvasitaiḥ* (Uvaṭa: e.g. *mo: dru: vāk: prāṅ*).

[4] *TP* xxi. 1. *vyañjanaṃ svarāṅgam.*

[5] *vyañjanaṃ kevalam avasthātuṃ na śaknoti kiṃ tu sāpekṣam: svaras tu nirapekṣaḥ.*

[6] Cf. Trubetzkoy, *Principes de Phonologie*, trsl. Cantineau, pp. 196 ff.; De Groot, 'Voyelle, Consonne et Syllabe', *ANPE* xvii. 21 ff.

[7] Cf. D. Thrax, ed. Uhlig, p. 16, Bekker, p. 632. *Συλλαβὴ δέ ἐστι κυρίως σύλληψις συμφώνου μετὰ φωνήεντος ἢ φωνηέντων.* For similar Latin definitions cf. Froehde, *Die Anfangsgründe der röm. Grammatik*, pp. 101 ff.

[8] Ed. Uhlig, pp. 9, 11; Bekker, p. 631. *Φωνήεντα δὲ λέγεται ὅτι φωνὴν ἀφ' ἑαυτῶν ἀποτελεῖ . . . σύμφωνα δὲ λέγεται ὅτι αὐτὰ μὲν καθ' ἑαυτὰ φωνὴν οὐκ ἔχει, συντασσόμενα δὲ μετὰ τῶν φωνηέντων φωνὴν αποτελεῖ.*

[9] And thence also, like *varṇa*, to mean simply 'letter'—cf. *Mbh.* 1. i. 2, on *Pāṇ. ŚSū.* 7–8 (Kielhorn, i. 36).

[10] Cf. *RP* vi. 35. *na saṃyogaṃ svarabhaktir vihanti*; Uvaṭa on *VP* iv. 17. *na*

The etymology of the term *akṣara* is a matter of some doubt. Most usually it is derived from the negative prefix *a-* plus the verbal root *kṣar-*, 'flow, perish', i.e. 'imperishable'[1]—a term which is not inappropriate as applied to its non-technical meaning of 'holy writ'. The *Vaidikābharaṇa* has an interesting alternative; taking *akṣara* as meaning 'vowel' and accepting the derivation from *a-*+*kṣar-*, it interprets the verb as meaning 'to be moved as subordinate to something else' (*anyāṅgatayā*).[2] The consonant was referred to in the *TP* itself as the 'subordinate member' (*aṅga*), and the implication of the etymology is thus that the consonant is 'moved' by the vowel.[3]

Etymologies of the word for 'consonant' (*vyañjana*) are various. Uvaṭa, deriving it from the verb *vy-añj-* in the sense of 'to manifest', explains that the consonants are so called 'because they manifest the meanings'.[4] This suggestion that the consonants rather than the vowels are responsible for the differentiation of meanings is to some extent justifiable in a language where there are only three basic vowel-classes, and where one of these (a) occurs approximately twice as frequently as all the rest together;[5] and in a notable discussion on paradigmatic lines regarding the semantic function of individual letters the *Mahābhāṣya* selects consonantal values for its examples (*yūpa*, *kūpa*, *sūpa*).[6]

3.21. *Syllabic Division*

Statements quoted above treat the vowel as the nucleus of the

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caitau varṇau repha-lakārayor ūṣmaṇāṃ ca madhya-vartināv api santau saṃyogasya vighātaṃ kurutaḥ. *AP* i. 104. *pūrva-svaraṃ samyogāvighātaś ca*. (For exceptions see 3.121 above, and Varma, pp. 84 f.) Cf. also Firth, *TPS*, 1948, p. 141; K. Bergsland, *Røros-Lappisk Grammatikk*, pp. 15 f.

[1] Cf. *Mbh.*, loc. cit. *akṣaraṃ na kṣaraṃ vidyāt—na kṣīyate na kṣaratīti vākṣaram*. The *Nirukta* adds a derivation from *akṣa*, 'axis', because it is 'the axis of speech' (xiii. 12. *na kṣīyate vākṣayo bhavati: vāco 'kṣa iti vā*).

[2] On *TP* i. 2. *na kṣarantīty akṣarāṇi: kṣaraṇam anyāṅgatayā calanam: tadabhāvāt svareṣv akṣara-śabdo vartate*.

[3] For the terminology cf. Arab *mutaḥarrik* (opposed to *sukuun*, with which cf. Skt. *virāma*). For full discussion of the Arab terminology cf. M. H. A. El Saaran, *A Critical Study of the Phonetic Observations of the Arab Grammarians* (Thesis, Ph.D., London, 1951), pp. 110 ff.

[4] On *RP* i. 6. *vyañjayanti prakaṭān kurvanty arthān iti vyañjanāni*. Otherwise *Vaidikābharaṇa* on *TP* i. 6. *pareṇa svareṇa vyajyata iti vyañjanam*.

[5] See Whitney, *Skt. Gr.*, §§ 22, 75. Cf. also Stetson, *Motor Phonetics*, p. 36; Czermak, loc. cit.

[6] 1. i. 2, on *Pāṇ. ŚSū.* 5 (Kielhorn, i. 30). Cf. O. Strauss, *ZDMG* N.F. 6, pp. 129 ff.

syllable; and they go on to describe the consonantal structure of the syllable in terms of the attachment of the consonants to the vocalic nuclei. The general rule is that an intervocalic consonant, as also an absolute initial or initial group, belongs with the following vowel, but that the first consonant of a medial group belongs with the preceding vowel, as also does a final consonant *in pausa.*[1] Some variation of doctrine is, however, found; the *RP* allows either the division of a medial consonant-group or its attachment *in toto* to the following vowel,[2] and the *TP* attaches to the following vowel a group consisting of consonant+semivowel or stop+fricative.[3]

The Indian statements are partially paralleled by those of Greek grammarians, more particularly of Herodianus Technicus in his work *Περὶ Συντάξεως τῶν Στοιχείων* ('On the Combination of Letters'.)[4] The principal Greek rules are that single intervocalic consonants belong with the following vowel, and that medial groups may be divided between syllables unless they are such as could stand at the beginning of a word, in which case the whole group belongs to the following syllable (a treatment reminiscent of the Slavonic languages).[5] Geminates are specified as being always divided, and the group stop+liquid as belonging to the following syllable.[6] The statements of the Latin grammarians are similar to those of the Greek, stressing in particular the principle of possible initial groups.[7]

It is to be noted, however, that these rules of the Indian phoneticians are not put to any further phonological purpose, nor can their basis in utterance be certainly established. But we may surmise that they were formulated with reference to the perceived termination and onset of certain prosodic syllable-features such as prominence and tone; the *PŚ* speaks of tone as a characteristic only of the vowel,[1] but the *VP* remarks that it may be shared by a consonant,[2] and the *Vaidikābharaṇa* makes the acute observation, which we have no particular reason to doubt, that in certain cases the final portion of a falling tone was borne by the consonant closing the syllable, which was accordingly lengthened.[3] In any case we should hardly be justified in following the example of the Western Sceptic, Sextus Empiricus, by referring to discussions on syllabic division as 'a lot of empty linguistic nonsense'.[4]

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[1] e.g. *AP* i. 55–57. *parasya svarasya vyañjanāni: saṃyogādi pūrvasya: padyaṃ ca.* Cf. *VP* i. 99–106.

[2] i. 23. 25. *svarāntare vyañjanāny uttarasya: . . . saṃyogādir vā.* Cf. xviii. 33, 35. *vyañjanāny uttarasyaiva svarasyāntyaṃ tu pūrva-bhāk: . . . saṃyogādiś ca vaivaṃ ca.* Chatterji, op. cit., § 134, suggests that the Nāgarī graphic system may be based on such a syllabic structure.

[3] xxi. 1–9. *vyañjanaṃ svarāṅgam: tat para-svaram: avasitaṃ pūrvasya: saṃyogādi: . . . anusvāraḥ svarabhaktiś ca: nāntasthāparam asavarṇam: . . . sparśaś coṣma-paraḥ. . . .*

[4] Most of the fragments are to be found in vol. ii, pp. 393 ff., of Lentz's edition. The statements are collated in Kühner-Blaß, *Ausführl. Gr. d. Gr. Sprache*, i. 349 ff.; see also Hermann, *Silbenbildung im griechischen und in den andern idg. Sprachen*, pp. 123 ff.

[5] Cf. O. Broch, *Slavische Phonetik*, § 216.

[6] Cf. Stetson, op. cit., pp. 84 ff.

[7] Cf. Seelmann, *Die Aussprache des Latein*, pp. 140 ff.; Hermann, op. cit., pp. 231 ff.; Hale, 'Syllabification in Roman Speech', *Harvard Studies in Classical Philology*, vii. 249 ff.

3.22. *Length and Duration*

From the point of view of syllabic structure the prosody of vowel-length is of great importance.[5] The device adopted by the Indians for purposes of phonological description is that of the *mātrā* or 'mora':

> A short vowel = 1 *mātrā*; a long vowel = 2 *mātrās*.[6]
>
> A *pluta* vowel = 3 *mātrās*.[7]
>
> A vowel having the length of a is short, and it's value is 1 *mātrā*; a vowel twice as long is long, and a vowel three times as long is *pluta*.[8]

The *mātrā* device has an evident utility in a system where the basic vowel-units are considered as members of qualitatively similar pairs each comprising a short and a long member, and where the junction of two similar short vowels results in the corresponding long vowel (e.g. **divi+iva = diviiva**).[1]

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[1] 11.

[2] i. 107. *vyañjanaṃ svareṇa sasvaram.* Cf. Pike, *Tone Languages*, p. 7: 'Although the tonemes are usually placed on the vowel of the syllable . . . a glide may end on a voiced consonant in the same syllable' (see also pp. 11, 30 n., 31). Both views are presented in the commentary on *AP* iii. 74. *asvarāṇi vyañjanāni: svaravantīty Ānyatareyaḥ.*

[3] On *TP* i. 37. . . . *tad anudātta-samatvaṃ keṣucit svarita-svareṣu na bhavati kintu tad-aṅga-bhūteṣu vyañjaneṣv eva: tāni svarita-grāhiṇīty ucyante: teṣāṃ kālādhikyaṃ vinoccāraṇaṃ na ghaṭate.* Cf. Varma, p. 168.

[4] *Adversus Grammaticos*, 169. . . . τῆς πολλῆς καὶ ματαίας παρὰ τοῖς γραμματικοῖς περὶ τούτων μωρολογίας. It has in fact been suggested that the basis of the Greek statements is orthographic; cf. Havet, *Revue Celtique*, xvi. 126; for inscriptional practice see also Stuart-Jones, *Class. Rev.* xv. 396 ff.; Hermann, op. cit., pp. 132 ff.; K. E. A. Schmidt, *Beitr. z. Gesch. d. Gram. d. Gr. u. Lat.* pp. 132 ff.

[5] Cf. *RP* i. 17–19. . . . *hrasvāḥ . . . dīrghāḥ . . . ubhaye tv akṣarāṇi.*

[6] *AP* i. 59, 61. *eka-mātro hrasvaḥ: dvi-mātro dīrghaḥ.*

[7] *RP* i. 27, 29–30. *mātrā hrasvaḥ: dve dīrghaḥ: tisraḥ pluta ucyate svaraḥ.*

[8] *VP* i. 55–58. *a-mātra-svaro hrasvaḥ: mātrā ca: dvis tāvān dīrghaḥ: plutas triḥ.* Cf. *TP* i. 31–36; *Sarvasaṃmata-Śikṣā*, 40; *Upalekha*, i. 8 ff.

The *pluta* or protracted vowel mentioned above is of rare occurrence and is bound to a very limited series of contexts; it represents the over-lengthening of the final vowel of a word or phrase and is used 'in cases of questioning, especially of a balancing between two alternatives, and also of calling to a distance or urgently'[2] (e.g. **idam bhuuyaaa idaaam iti**, 'Is this more, or that?'). For most phonological purposes, however, the *pluta* vowel may be ignored; as the *RP* points out, it occurs but three times in the *RV* and it is in all cases related to the special type of speech-function.[3]

The statements on vowel-length are followed by a reference to the length of consonants, the general prescription being $\frac{1}{2}$ *mātrā*,[4] though the *AP* says 1 *mātrā*;[5] the *VP* is even more specific in its detail:

> A consonant has a value of $\frac{1}{2}$ *mātrā*: $\frac{1}{4}$ *mātrā* is known as an *aṇu* ('moment') and $\frac{1}{2}$ *aṇu* is known as a *paramāṇu*.[6]

But the *mātrā* concept has no justification in connexion with consonants; certainly it might have been used in conjunction with the rules of syllable-division for purposes of stating syllable-quantity (see below), but in fact our treatises do not so employ it. Their statements are thus only of value as generalized prescriptions of relative duration; this unphonological approach undergoes a further degeneration in statements such as the following (from the *PŚ*):

> 1 *mātrā* is equivalent to the cry of the blue jay, 2 *mātrās* to that of the crow, 3 *mātrās* to that of the peacock, and $\frac{1}{2}$ *mātrā* to that of the mongoose.[7]

Here we have an attempt to define phonological length in terms of absolute phonetic duration, a practice comparable with a modern statement in terms of centiseconds. It is gratifying, however, to find that these attempts are almost certainly late interpolations by phonologically incompetent scholiasts: they appear in almost identical form in many of the late Śikṣās,[1] and it is significant that a similar verse which appears in our text of the *RP*[2] bears no comment by Uvaṭa.

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[1] Cf. Trubetzkoy, *Principes*, pp. 201 ff.

[2] Whitney, *Skt. Gr.*, § 78.

[3] i. 31. *'adhaḥ svid āsī3d' 'upari svid āsī3d' arthe plutir 'bhīr iva vindatī̐3' triḥ.*

[4] e.g. *TP* i. 37; *Sarvasaṃmata-Śikṣā*, 40; *Upalekha*, i. 11.

[5] i. 60.

[6] i. 59–61. *vyañjanam ardha-mātrā: tad-ardham aṇu: paramāṇv ardhāṇu-mātrā.*

[7] 49. *cāṣas tu vadate mātrāṃ dvi-mātraṃ caiva vāyasaḥ*
śikhī rauti tri-mātraṃ tu nakulas tv ardha-mātrakam.

3.23. *Quantity*

Beside the terms 'short' and 'long' (*hrasva*, *dīrgha*) we find listed in the introduction to the *RP* and in the concluding stanzas of the *TP* the terms 'light' (*laghu*) and 'heavy' (*guru*).[3] These latter terms refer primarily to the quantity of the syllable for metrical purposes; but since the term *akṣara*, 'syllable', is also used to mean 'vowel', the vowel rather than the syllable is regularly stated to be 'light' or 'heavy'. Whitney's statement that 'for metrical purposes syllables (not vowels) are distinguished by the grammarians as heavy or light'[4] is unfortunately not true: but we cannot but agree when he remarks,

> The distinction in terms between the difference of long and short in vowel-sound and that of heavy and light in syllable-construction is valuable and should be observed.[5]

The failure of our authors to observe this distinction in fact leads to some confusion. The actual rules as to syllabic quantity, however, are not in any doubt:[6]

'Heavy' are:

(*a*) (A syllable containing) a long vowel (including a nasalized vowel)

(*b*) (A syllable containing) a short vowel followed by a consonant-group or by a final consonant *in pausa*.

'Light' is:

(A syllable containing) a short vowel *not* followed by a consonant-group.

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[1] Cf. Ghosh, *PŚ* Notes, p. 77.

[2] xiii. 50.

[3] *RP* Introd. 5; *TP* xxiv. 5.

[4] *Skt. Gr.*, § 79.

[5] Ibid. Cf. Firth, *TPS*, 1948, p. 139.

[6] Cf. *TP* xxii. 14–15.

yad vyañjanāntaṃ yad u cāpi dīrghaṃ
saṃyoga-pūrvaṃ ca tathānunāsikam:
etāni sarvāṇi gurūṇi vidyāt
śeṣāṇy ato 'nyāni tato laghūni.
avyañjanāntaṃ yad dhrasvam asaṃyoga-paraṃ ca yat
ananusvāra-saṃyuktam etal laghu nibodhata.

Cf. *AP* i. 51–54; *RP* i. 20–21; *Pāṇ.* I. iv. 10–12; Piṅgala, *Ch. S.* Introd. 4.

A final short vowel *in pausa* may be lengthened and so form a heavy syllable.[1]

It will be noted that syllable-division and length of consonants are not employed in these statements of syllabic quantity. One exception is provided by the *RP*, which states,

> (A syllable containing) a long vowel is heavy; and heavier if accompanied by a consonant; (a syllable containing) a short vowel with a (preceding) consonant is light; and lighter without a consonant.[2]

This suggests a series of four quantitative values, viz.

'Heavier' (2½ *m.*)
'Heavy' (2 *m.*)
'Light' (1½ *m.*)
'Lighter' (1 *m.*)

But this distinction has no metrical consequences, and is not otherwise mentioned by the phoneticians,[3] who regularly apply the *mātrā*-concept to vowel-length and not to syllable-quantity. But a dangerous step has been taken in the statement of the *VP* that,

> A (short) vowel before a consonant-group is equivalent to 2 *mātrās*.[4]

We may assume the logical background of such a statement to have been somewhat as follows:

(*a*) Short vowel before consonant-group = heavy syllable.
(*b*) Long vowel = heavy syllable,
∴(*c*) Short vowel before consonant-group = long vowel.
(*d*) Long vowel = 2 *mātrās*,
∴(*e*) Short vowel before consonant-group = 2 *mātrās*.

The phonological consequences of such reasoning are serious enough, but the greater danger lies in the temptation to take the next step, viz.

∴ by (*a*) and (*e*), heavy syllable = 2 *mātrās*.

And this step has in fact been taken by the metrical authorities, who employ *mātrā* in a quite different sense from that intended by the phoneticians, with the convention that a light syllable is equivalent to 1 *mātrā* and a heavy syllable to 2 *mātrās*.[1] That the two uses of the term have nothing in common is recognized by the author of the *Vṛttamuktāvalitarala*, a manuscript work quoted by Varma, whose translation I take the liberty of reproducing:[2]

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[1] Cf. *VP* iv. 109; *AP* loc. cit.; Piṅgala, loc. cit. See also Gauthiot, *Fin de Mot*, chap. ix.

[2] xviii. 41–44. *guru dīrgham: garīyas tu yadi savyañjanaṃ bhavet: laghu savyañjanaṃ hrasvam: laghīyo vyañjanād ṛte.*

[3] Except in an interpretational quibble by Patañjali (discussed by Konow, op. cit., p. 310).

[4] iv. 109. *saṃyoga-pūrva* (*-vyañjanāntāvasāna*)*-gatāḥ svarā dvi-mātrāḥ.*

> By a conventional tradition the quantity of a long syllable is measured as two moras, which are attributed even to the *pluta* vowel (that has three moras). In the same way, although the quantity of a consonant is a half-mora, a syllable ending in a consonant is measured two moras. That a consonant should not increase the quantity of the syllable is due to convention.

The last sentence is reminiscent of the remarks of the *RP* quoted above.

It is most unfortunate that the term *mātrā* should have been employed at two different but related levels of analysis. The confusion is ultimately traceable to the equation of syllable with vowel, and the extension of the single term *akṣara* to cover both.

3.24. *Tone* (*svara*)

The Indian authorities recognize the existence of three tone-classes in Vedic:[3]

'There are three tones, *udātta*, *anudātta*, and *svarita*';[4] *udātta* means literally 'raised', *anudātta* 'unraised', and *svarita* 'intoned'. These are described by the *AP* as follows:

> In a given register a syllable with high tone is *udātta*, with low tone *anudātta* and with falling (*ākṣipta*) tone *svarita*; the first half of the *svarita* is *udātta*.[5]

The literal meaning of *ākṣipta* is 'cast down'. The description given in the *VP* reads:

> The *udātta* is high, the *anudātta* low, and the *svarita* a combination of the two; . . . the first half of the *svarita* is *udātta* and the latter part is made to fall (*praṇihanyate*).[6]

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[1] Cf. Piṅgala, *Ch. S.* i. 9 ff., with Halāyudha's comment.

[2] p. 89.

[3] The *TP* appears further to have observed the neutralization of tonal distinctions in whispered speech (xxiii. 4–11; cf. Pike, *Tone Languages*, p. 34).

[4] *PŚ* 11. *udāttaś cānudāttaś ca svaritaś ca svarās trayaḥ.*

[5] i. 14–17. *samāna-yame 'kṣaram uccair udāttam: nīcair anudāttam: ākṣiptaṃ svaritam: svaritasyādito mātrārdham udāttam.*

[6] i. 108–10. *uccair udāttaḥ: nīcair anudāttaḥ: ubhayavānt svaritaḥ.*
126. *tasyādita udāttaṃ svarārdha-mātram.*
iv. 140. *svaritasya cottaro deśaḥ praṇihanyate.*

and in the *TP*:

> The *udātta* is high, the *anudātta* low, and the *svarita* a compound tone . . . it begins at the level of the *udātta* and the rest is at the level of the *anudātta*: so say the teachers: some say it is a continuous fall (*pravaṇa*).[1]

The term *pravaṇa* means literally 'downhill slope', i.e. $\overline{\underline{\diagdown}}$.

An exception is provided by the *RP*, which states,

> The first ½ or ¼ *mātrā* of the *svarita* is higher than the *udātta*: the rest is *anudātta*.[2]

This statement suggests a relation of *udātta* : *svarita* : *anudātta* somewhat as follows:– $\overline{\underline{- : \diagdown : \_}}$; and this is supported by the peculiar system of tone-marking employed in the texts of the *RV*, where the *svarita*, and not the *udātta*, is indicated by a vertical stroke above the syllable:[3] thus a word such as **agninaa**, where the order of tones is *anudātta—udātta—svarita*, is marked **a̱gnina̍a**, the medial *udātta* syllable being unmarked. This peculiarity of marking is also followed by the *AV* and by certain texts of the *YV*; elsewhere in the *YV* the marking is in accordance with the prescribed realization, e.g. **agninaa**.

For the *svarita* we find various other terms occasionally employed, for example, in the *TP* '*dvi-yama*', i.e. 'of two pitches',[4] and in the *RT* '*un-nīca*', i.e. 'high-low';[5] the *Nāradī Śikṣā* says of the *svarita* that it is pronounced 'between the *udātta* and the *anudātta*' (*udāttānudātta-madhye*),[6] a description that is reminiscent of the marking found in the texts of the *Sāmaveda*, where the *udātta* is marked with a figure 1, *anudātta* with 3, and *svarita* with 2 (e.g. $\overset{3}{\textbf{a}}\overset{1}{\textbf{gni}}\overset{2}{\textbf{naa}}$).[7]

The *svaritas* are phonologically divided into two main subclasses, the so-called 'independent' and 'dependent' (or 'enclitic'). The former is generally explained as the result of a coalescence of an *udātta* with an *anudātta* syllable (e.g. $\underset{\textbf{divi}}{\overline{=}} + \underset{\textbf{iva}}{\overline{==}} = \underset{\textbf{diviiva}}{\overline{=\diagdown=}}$; $\underset{\textbf{ni-}}{\overline{=}}$ +

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[1] i. 38–40, 46–47. *uccair udāttaḥ: nīcair anudāttaḥ: samāhāraḥ svaritaḥ* (cf. *Pāṇ.* I. ii. 31) . . . *ādir asyodātta-samaḥ śeṣo 'nudātta-sama ity ācāryāḥ: sarvaḥ pravaṇa ity eke.* Cf. *RP* iii. 1.

[2] iii. 4–5. *tasyodāttatarodāttād ardha-mātrārdham eva vā: anudāttaḥ paraḥ śeṣaḥ.*

[3] Cf. also Varma, 'The Vedic Accent and the Interpreters of Pāṇini', *JRAS Bombay* 26. 1, 1950, pp. 1 ff.

[4] xix. 3.

[5] 54.

[6] *SS*, p. 412.

[7] Cf. Varma, 'Studies in the Accentuation of the Sāmaveda', *Proc. VI All-India Oriental Conf.*, Patna, 1930, pp. 517 ff.

$\underset{\text{-ak}}{\overset{\overline{\quad}}{\underline{-}}} = \underset{\text{nyak}}{\overset{\overline{\quad\quad}}{\underline{\frown\!\!\searrow}}}$); the latter is a variant of the *anudātta* immediately following an *udātta*—as Pāṇini puts it:

> After an *udātta* a *svarita* is substituted for the *anudātta*.[1]

The close phonetic relationship of the independent and dependent *svaritas*, however, is not denied,[2] and in some texts we find independent *svaritas* indicated, like the enclitics, by an *udātta* on the preceding syllable.[3] In both cases it seems certain that its description as a 'falling' tone was justified, whether it represented the glide from one 'register' tone (*udātta*) to another (*anudātta*), or an independent 'contour' tone (to use Pike's terminology).[4] The statements which refer to the first ½ mora as high and the remainder as low are probably speaking not in phonetic but in a type of phonological terminology that is prophetically redolent of Prague.[5]

It will have been noted that the *AP*, in describing the *udātta* as high and the *anudātta* as low, made the important specification, 'within a given register'; the pitches, that is to say, are relative and not absolute—a point which is specifically made by Patañjali:

> The terms 'high' and 'low' have no absolute signification.[6]

To quote a modern parallel,

> It is the relative height of the tonemes, not their actual pitch, which is pertinent to their linguistic analysis.[7]

Certain of our treatises attempt to give some account of the physiological processes whereby the tonal distinctions are effected. The *RP*'s statement is as follows:

> The three tones are *udātta*, *anudātta*, and *svarita*; they are effected by tenseness, laxness and '*ākṣepa*' respectively.[8]

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[1] VIII. iv. 66. *udāttād anudāttasya svaritaḥ.* Cf. *TP* xiv. 29. *udāttāt paro 'nudāttaḥ svaritam. Upalekha* viii. 7. *udāttād anudāttaṃ svārayet. . . .*

[2] Cf. Wackernagel, *Ai. Gr.* i, § 249. But for various nuances, which we can scarcely hope to interpret, cf. *TP* xx. 9–12; *VP* i. 125.

[3] Cf. Macdonell, *Ved. Gr.*, §§ 84.4*b*; 85.

[4] *Tone Languages*, pp. 5 ff.

[5] Cf. Trubetzkoy, *Principes*, pp. 204 ff.; Martinet, *Phonology as Functional Phonetics*, pp. 16 ff. ('If . . . we make use of the concept of mora, we can consider all melodic tones as successions of two punctual tones and thus reduce the number of distinct prosodical units . . .'); Jakobson, 'Die Betonung und ihre Rolle in der Wort- und Syntagmaphonologie', *TCLP* iv. 164 ff. On the limitations of this technique, cf. Martinet, *Lingua*, I. i. 51.

[6] I. 2. 1, on *Pāṇ.* I. ii. 29–30 (Kielhorn, i. 207). *idam ucca-nīcam anavasthita-padārthakam.*

[7] Pike, *Tone Languages*, p. 4; cf. *Phonetics*, pp. 27 ff.

[8] iii. 1. *udāttaś cānudāttaś ca svaritaś ca trayaḥ svarāḥ*
āyāma-viśrambhākṣepais ta ucyante

The term '*ākṣepa*', 'casting down', has already been encountered and can hardly be related to a physiological basis: the other terms, however, are extremely suggestive of a reference to the state of the vocal cords, and this is in fact borne out by the explicit statement of the *Pāri-Śikṣā*,[1] examined by Varma,[2] as also by the corresponding passage in the *TP*:

> The high tone is effected by tension, hardness and constriction of the glottis; the low tone is effected by laxness, softness and widening of the glottis.[3]

These statements are not so very remote from a modern description such as that of Forchhammer:

> Im Mittelregister können wir die Tonhöhe sowohl durch Spannen wie auch durch Abschlanken bzw. Verdicken der Stimmlippen verändern,[4]

and certainly do not merit the criticism made of them by Whitney—

> There is evidently much more guesswork than true observation in this rule. . . . There is nothing at all to commend in such a description of the way in which low tone is produced.

Even today the precise mechanism of pitch variation is a difficult and debated topic.[5]

It should here be mentioned that in the musical treatises each octave is referred to as the '*dviguṇa*' or 'double' of its predecessor,[6] and it would be tempting to conclude from this that the authors were further acquainted with the theory of vibrational frequency-ratios; this interpretation is invalidated, however, by the commentator's statement that 'double' means simply 'double in effort'.[7] The west is thus here in advance of the east with Euclid's observation:

> Of the sound-movements some are of higher and some of lower frequency: the high frequencies produce sharp sounds and the low frequencies deep sounds.[8]

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[1] 81–82. . . . *aṇutā kaṇṭha-bilasya . . . vistṛtā kaṇṭha-bilasya.*

[2] Op. cit., p. 165.

[3] xxii. 9–10. *āyāmo dāruṇyam aṇutā khasyety uccaiḥ-karāṇi śabdasya: anvavasargo mārdavam urutā khasyeti nīcaiḥ-karāṇi.*

[4] Op. cit., p. 201.

[5] Cf. Russell, *Speech and Voice*, pp. 198 ff. See further R. Curry, 'The Mechanism of Pitch Change in the Voice', *Journ. of Physiology*, xci, 1937, pp. 254 ff.

[6] e.g. *Saṃgītaratnākara*, I. iii. 7.

[7] Kallinātha on loc. cit. (I am indebted to Dr. A. Bake for this reference.)

[8] *Sectio Canonis* 23 (M). *Τῶν δὲ κινήσεων αἱ μὲν πυκνότεραί εἰσιν, αἱ δὲ ἀραιότεραι, καὶ αἱ μὲν πυκνότεραι ὀξυτέρους ποιοῦσι τοὺς φθόγγους, αἱ δὲ ἀραιότεραι βαρυτέρους.*

If the ancient linguists employed any graphic method of indicating tone, it has (apart from the orthographic systems of our texts) been long since lost to us; but we have something closely parallel in the manual gestures prescribed to accompany recitation of the Vedic hymns. We in fact find the terminology of these prescriptions to be related to that of the phonetic accounts. The root *kṣip-*, 'to throw', which was used in the phonetic description of the *svarita* appears also in the gestural terms *ūrdhva-kṣepa* and *adhaḥ-kṣepa*, 'throwing up' and 'throwing down', referring to the manual gestures accompanying the *udātta* and *anudātta* tones respectively: the gesture for the *svarita* is said in this case to consist of a combination of the two.[1] The verb *praṇihanyate*, 'is made to fall', likewise used in the phonetic description of the *svarita*, again appears in the description of the gesture accompanying it.[2] Uvaṭa, commenting on the *RP*'s phonetic use of '*ākṣepa*', had equated it with '*tiryag-gamana*', 'a moving across',[3] and this term also appears in the gestural section of the *VP*, where Kāṇva is quoted as teaching that for one type of *svarita* the hand is to be moved 'across and downwards',[4] i.e. diagonally downwards. It thus appears probable that some of the tonal terminology is really based on gestural movements, which are of course related in turn to the kinaesthetic and acoustic phenomena.[5]

The Vedic tonal system has left little if any trace in the modern Indo-Aryan languages.[6] Haug, in a study of contemporary Vedic chanting, claimed to have found the ancient tonal system preserved (a *svarita*, for example, being sung on two notes of which the first was the higher);[7] these claims cannot be accepted, however, without further investigation.

Greek, like Vedic, had preserved the Indo-European tonal system with considerable fidelity, and it will be of some interest to see to what extent the parallel systems have given rise to parallel descriptions by the native authorities.[1] As regards the high and low tones, the Greek writers are agreed in according to them the titles *ὀξύ*, 'sharp, acute', and *βαρύ*, 'heavy, grave', terms which are parallel to the Sanskrit *udātta* and *anudātta*. For the compound tone we find the terms *δίτονος*, 'of two tones' (comparable with the *dvi-yama* of the *TP*) and *ὀξυβάρεια*, 'acute-grave' (comparable with the *un-nīca* of the *RT*); the common traditional term is *περισπώμενον*, 'bent round, circumflex', but according to a Byzantine source this term referred simply to the graphic prosodic symbol and was substituted for *ὀξυβάρεια* by the great Alexandrian grammarian, Aristophanes of Byzantium, when he changed that symbol from ^ to ⌒; the same source also provides a phonetic description which parallels that of the Indian *svarita*, viz., that for the 'circumflex' the voice starts at the acute pitch and falls to the grave, thus constituting a combination of the two.[2] Dionysius Thrax distinguishes various types of 'circumflex', which are further subdivided by Glaucus of Samos, but, as in the case of the Indian descriptions of particular sub-categories of *svarita*, their precise identification is impossible.

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[1] *Yājñ.-Ś.* 58; Rāmaśarman on *Pratijñā S.*, ed. Weber, p. 92. Cf. Uvaṭa on *VP* i. 121. *tatrodātte ūrdhva-gamanaṃ hastasya anudātte 'dho-gamanaṃ hastasya. . . .*

[2] *VP* i. 124. *ṛjuṃ nihatya praṇihanyate udātte.*

[3] On *RP* iii. 1. *ākṣepo nāma tiryag-gamanam.*

[4] i. 123. *anudāttaṃ cet pūrvaṃ tiryaṅ nihatya Kāṇvasya*; cf. i. 122. The term is also used in a gestural sense by the *Abhinayadarpaṇa* (200); in a phonetic sense it appears in the *ŚB* (xi. iv. 2. 7. Mādhy. *atha haitat tiryak: yo 'yaṃ yāvataivādatte tāvatā nidadhyāt . . .*).

[5] Cf. also S. K. Chatterji, *Proc. 2nd Int. Cong. Phon. Sc.*, p. 176.

[6] Cf. Bloch, *L'Indo-Aryen*, p. 48; but see also R. L. Turner, *JRAS*, 1916, pp. 203 ff.

[7] *Über das Wesen und den Werth des wedischen Accents*, pp. 48–52.

Regarding the physiological processes of tonal differentiation, Glaucus provides a parallel to the Indian sources when he describes the acute as *ἐπιτεταμένη*, 'tense', and the grave as *ἀνειμένη*, 'lax'. We may also note that for tone in general the Greeks use not only the term *προσῳδία* ('tune' = Lat. *accentus*, equivalent to Skt. *svara*) but also *τόνος* ('tension').[3]

The Greek sources also mention a further type of tone, the *μέσον* or 'middle tone'; the identification of this with the circumflex, as assumed by many scholars, can hardly be supported in view of the fact that we find them mentioned as distinct categories within individual statements. The 'circumflex' tones referred to by our authorities are those which we find marked as such in our texts, and these are all in the nature of 'independent' tones (cf. the 'independent *svarita*' mentioned above); but on the evidence of Greek musical fragments Professor Turner has long since made the observation that,

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[1] Texts of the Greek statements which follow will be found collated in Postgate, *Guide to Greek Accentuation*; Sturtevant, op. cit., pp. 94 ff.

[2] . . . *συνέβαινε ταῖς περισπωμέναις λέξεσιν εὐθὺς ἀρχομένην τὴν φωνὴν ὀξύ τι ὑπηχεῖν κατατρέπειν δὲ ὡς εἰς τὸ βαρύ, οὐδὲν ἄλλο ἢ μίξιν καὶ κρᾶσιν ἐξ ἀμφοῖν, τοῦ τε ὀξέος καὶ τοῦ βαρέος* . . .

[3] The etymologically equivalent Skt. *tāna* is used only in the sense of 'monotone' (cf. Uvaṭa on *VP* i. 130; Rāmaśarman on *Pratijñā Sūtra* 8; Weber, *Ind. St*. x. 423 ff.).

> When a long unaccented vowel was sung on two notes, there was a tendency . . . in the case of those following an accented syllable to make the first the higher. . . . This is in agreement with what we may surmise to have been the nature of the vowels following an accented syllable from a comparison with the Vedic accent;[1]

the unmarked syllable following an acute was thus equivalent to the 'dependent' or 'enclitic' *svarita* of Vedic. It seems reasonable to proceed, with Grammont, to identify this tone with the μέσον of the Greek authorities:

> Ce ton figure toujours à côté de l'aigu; c'est qu'on ne peut pas retomber de l'aigu au grave par une chute dépourvue de durée, mais par un état intermédiaire, qui partant de la hauteur de l'aigu arrive progressivement à celle du grave. . . . Le μέσος est exactement l'équivalent du ton que les Hindous appellent *svarita* (descendant) et qui est intermédiaire entre l'*udātta* (haut, aigu) et l'*anudātta* (non haut, bas, grave).[2]

Sturtevant's objection that ' "intermediate" would be a peculiarly inept name for an accent which contained within itself both the extremes' loses much of its force in view of the description of the *svarita* by the *Nāradī Śikṣā* (viz. *udāttānudātta-madhye*) and the marking-system of the *Sāmaveda* (see above).[3]

3.3. *Tempo*

It will be appropriate to conclude the discussion of synthesis with a feature which is pre-eminently related to the major units of utterance. The following statement on the subject of tempo appears in the *RP*:

> There are prescribed three speeds of utterance—reduced, medium and rapid; for repetition one should employ the rapid speed, for recitation the medium speed, and for the instruction of pupils the reduced speed.[4]

This recognition of the pedagogical function of the 'reduced' tempo (*vilambita*) finds an echo in Paul Passy's '. . . "prononciation familière ralentie", que je tiens pour spécialement convenable à l'enseignement'.[1] But of greater interest would be a recognition of the significance of tempo as a linguistic category; in addition to important semantic functions its consequences are evident at all levels of analysis,[2] and modern linguistics must sooner or later find appropriate measures for its description. The *VŚ* does in fact go so far as to observe that the medium speed is the basis for the establishment of phonological length-distinctions.[3] In this, as in so many of the matters discussed, the Indian pioneers have pointed the way for future research; the details of their work are such as often to evoke the comment,

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[1] *Class. Rev.* xxix, 1915, p. 196.

[2] *Phonétique du Grec Ancien*, p. 388.

[3] Cf. also Vendryès, *Traité d'Accentuation Grècque*, § 45, 'Le mot μέσος signifierait alors ici non pas intermédiaire . . . mais combiné des deux.'

[4] xiii. 46, 49. *tisro vṛttīr upadiśanti vāco vilambitāṃ madhyamāṃ ca drutāṃ ca:*
abhyāsārthe drutāṃ vṛttiṃ prayogārthe tu madhyamām
śiṣyāṇām upadeśārthe kuryād vṛttiṃ vilambitām.

> nihil est iam dictum quod non dictum sit prius

—their principles are such as may inspire us to disprove it.

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[1] *Conversations Françaises*, p. vi.

[2] See e.g. Stetson, *Motor Phonetics*, pp. 67 ff., 102, 124 f., and (with Hudgins and Moses) 'Palatograms change with rates of articulation', *ANPE* xvi. 52 ff. Fries and Pike, *Language*, xxv, 46 f. Cf. also *TPS*, 1950, pp. 190 f.

[3] 346 (Lüders, p. 97).

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